

Founded in 1832

RAILWAY **L**OCOMOTIVES **AND** **C**ARS

FEBRUARY 1955

One of Five Specialized Railway Age Publications

DESIGNED FOR ALL
TYPES OF GONDOLAS

PROVIDES
MULTIPLE
STRAP
LOCATIONS



- ACCOMMODATES BANDS OR WIRES
- NO SHARP CORNERS TO SEVER ANCHORAGE

CONTINUOUS
**LADING BAND
ANCHOR**
and
REINFORCEMENT

(PATENT PENDING)

THE WINE RAILWAY APPLIANCE CO.

TOLEDO 9, OHIO



RAIL-FREIGHT... Industry's Best Buy!

THAT'S what we've been talking about this past year in Railway Freight Traffic, and other publications.

Each month we furnish thousands of reprints of these advertisements to the railroads for distribution to traffic personnel and shippers. We like to think that these little messages are small voices in the competitive jungle that is today's transportation picture—blazing a trail to the door of America's best transportation buy—rail-freight.

If these reprints can serve your railroad, too, just tell us how many you can use each month. We'll be glad to send them on to you—without charge, of course. We're all in this together.

**BUFFALO BRAKE BEAM CO.
UNIT TRUCK CORPORATION**
A Half Century of Brake Beam Progress
NEW YORK • BUFFALO • HAMILTON, ONT.



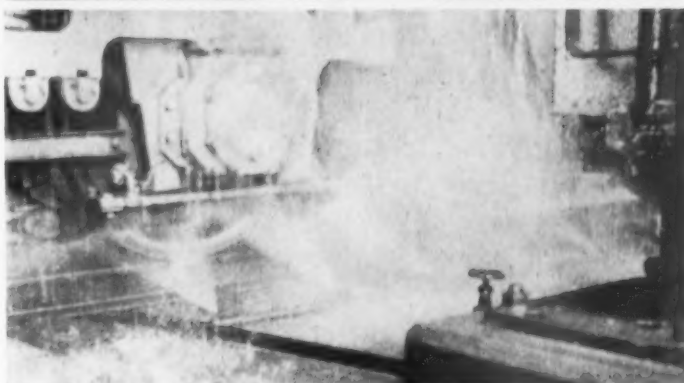
Thanks...

for your wonderful response

This message first appeared in Railway Age in December 1953. Since then, we have had a most gratifying response from both management and individual railroad employees, many of whom are giving freely of their own time to promote better community relations for our industry. We, here at BUFFALO, will continue to raise our small voice during the coming year.

Save Money

Clean diesel
wheels and trucks
with automatic
Oakite "track-trip"
spray-washing



Oakite automatic "track-trip" wheel cleaning set-up saves money. It prevents solution and rinse water waste. Top picture, cleaning. Bottom picture, rinsing.

YOU ARE LOOKING at a set-up for cleaning and rinsing diesel wheels and trucks. It was designed by Oakite for a big Western Railroad. These pictures were taken at that yard.

THIS ROAD wanted to eliminate costly, time-consuming manual cleaning. They were looking for some simple, inexpensive mechanical method... one they could build themselves in their own yard.

HERE'S HOW IT WORKS. Pressure, transferred from wheel flange to track tripper, depresses valves for spray cleaning. Solution spray responds only to wheel pressure. Spraying stops as wheel pressure diminishes.

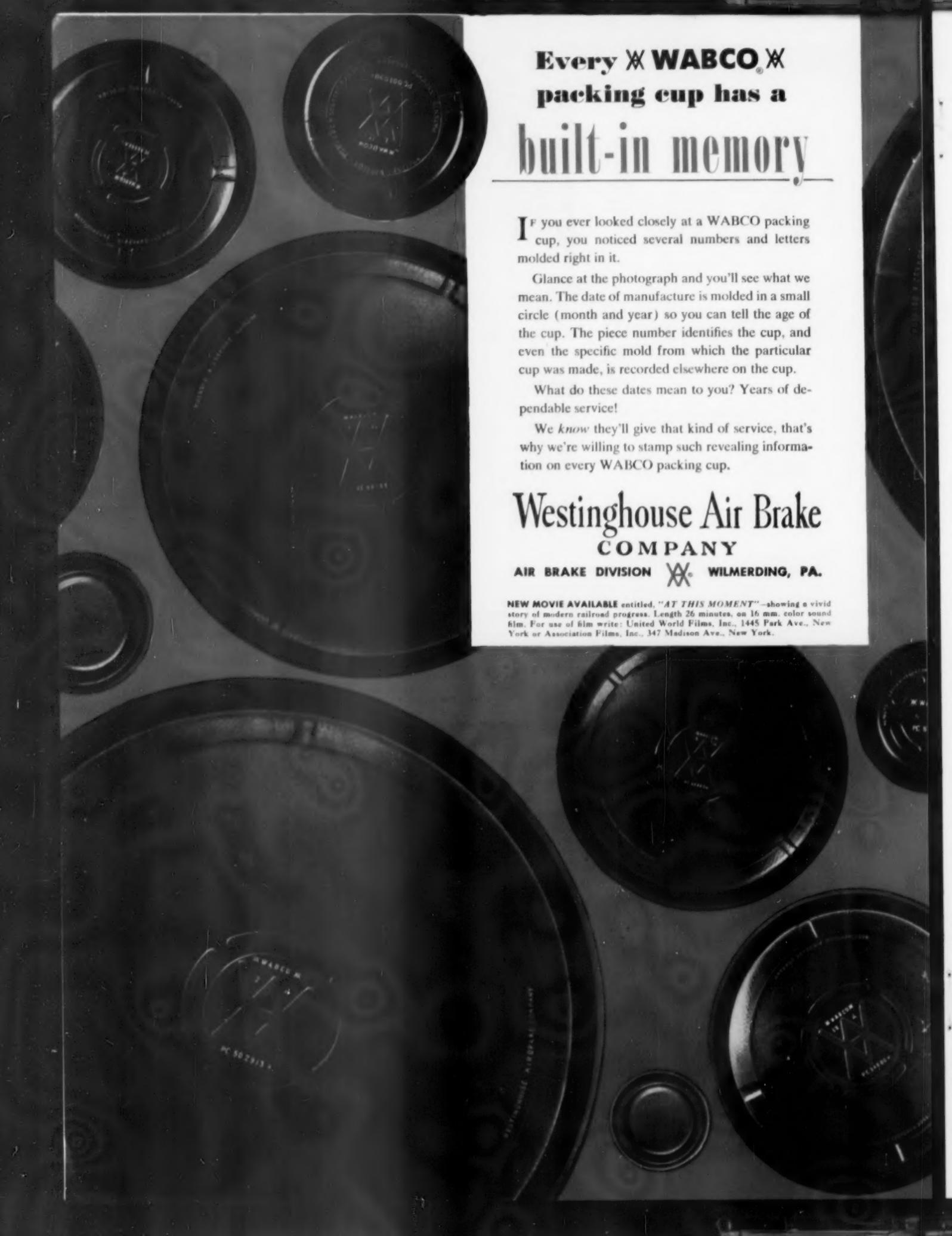
RESULTS. Considerable savings in solution upkeep and less waste of rinsing water since spraying occurs only as wheels enter spraying area. No time wasted for manual valve adjustments. No hand scrubbing.

If you'd like more information on washing diesel wheels and trucks just drop us a line. We'll be glad to send you complete details, drawings.

Oakite Products Inc., 46 Rector Street, New York 6, New York

OAKITE

RAILWAY DIVISION



Every **WABCO**
packing cup has a
built-in memory

If you ever looked closely at a WABCO packing cup, you noticed several numbers and letters molded right in it.

Glance at the photograph and you'll see what we mean. The date of manufacture is molded in a small circle (month and year) so you can tell the age of the cup. The piece number identifies the cup, and even the specific mold from which the particular cup was made, is recorded elsewhere on the cup.

What do these dates mean to you? Years of dependable service!

We *know* they'll give that kind of service, that's why we're willing to stamp such revealing information on every WABCO packing cup.

**Westinghouse Air Brake
COMPANY**

AIR BRAKE DIVISION **W** WILMERDING, PA.

NEW MOVIE AVAILABLE entitled, "*AT THIS MOMENT*"—showing a vivid story of modern railroad progress. Length 26 minutes, on 16 mm. color sound film. For use of film write: United World Films, Inc., 1445 Park Ave., New York or Association Films, Inc., 347 Madison Ave., New York.

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International Advertising Agency
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Wittelsbacher Allee 60, West Germany



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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

FEBRUARY, 1955

VOLUME 129, NO. 2

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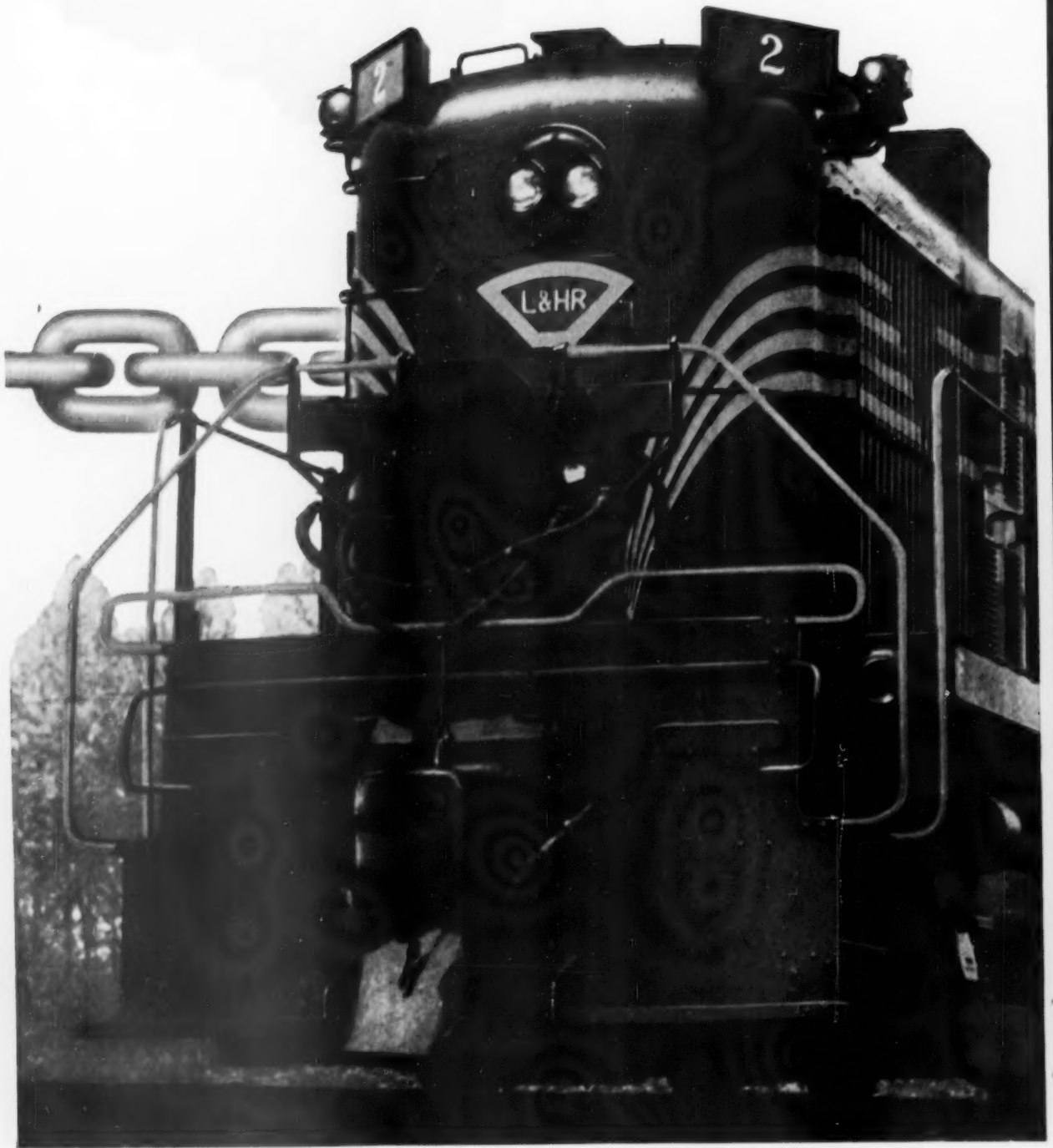
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Linking New England



with the rest of the Nation!

Connecting New England with the West, South and Southwest, the Lehigh & Hudson River Railway forms an important link via Maybrook, N. Y. Modern, powerful Diesel-Electric locomotives maintain a smooth flow of traffic on this essential route.

Sinclair GASCON[®] Oil in the crankcases of the engines, and Sinclair JET LUBRICANT[™] in the traction motor gear cases help maintain this smooth operation.

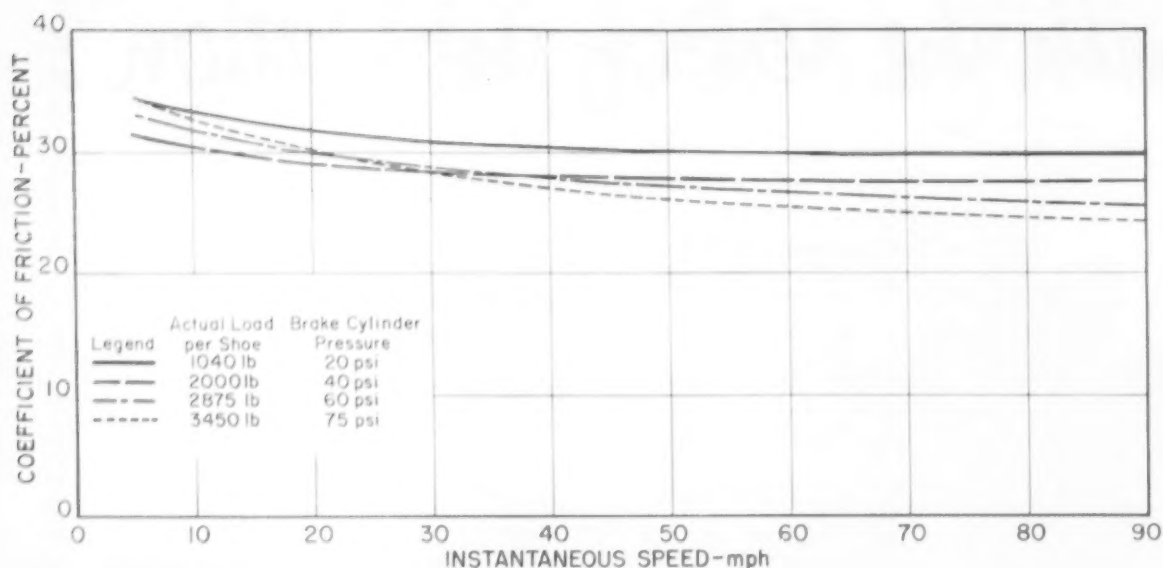
Both of these fine Sinclair Products for railway Diesel-Electric locomotives have an outstanding record on the Lehigh & Hudson River Railway. Are your locomotives enjoying similar excellence of operation?



SINCLAIR REFINING COMPANY

*RAILWAY SALES • New York
Chicago • Houston*

EQUIPMENT...New Ideas—New Uses



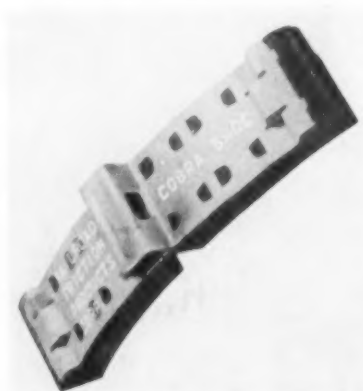
How the coefficient of friction of the Cobra Shoe varies with instantaneous speeds.

A High-Friction Wheel-Tread Brake Shoe

After six years of intensive research to develop a brake-shoe material possessing a high and uniform coefficient of friction, high resistance to wear, strength adequate to prevent disintegration in service and causing a minimum of wear and thermal effect on the tread of the wheel, the Westinghouse Air Brake Company and the Johns-Manville Corporation, as announced in the Supply Trade item on page 92 of this issue have formed the Railroad Friction Products Corporation to produce and market a tread type brake shoe of a new material which meets these specifications. The brake shoe, known as the Cobra Shoe, is pressure moulded of a composition friction material in an organic binder on a steel back and is interchangeable with iron shoes in standard brake heads. Its weight is slightly less than one half the weight of an iron shoe.

As indicated in the graph, the Cobra Shoe has a coefficient of friction on the tread of a car wheel which is relatively flat throughout the speed range, but rises slightly at low speeds. The slope of the curve, however, is so flat that there is no marked increase in deceleration at the end of a stop and the characteristic lurch at the end of a stop with the brakes fully applied is minimized. Because of this characteristic, it is unnecessary to employ speed governor control for high-speed braking on passenger cars.

The coefficient of friction of the Cobra Shoe is approximately four times that of the cast-iron shoe. This high-friction characteristic permits the use of cylinders of one half the diameter which give one fourth of the force values normally used for comparable stopping distances with



The Cobra Shoe is moulded under pressure on a steel back.



cast-iron shoes. Deceleration values are unaffected by water.

For new passenger cars, it is estimated that the Cobra Shoe will permit a weight reduction of about 3,000 lb. The reduced stresses caused by the lower braking ratio will permit the design of lighter truck side frames and weight can be saved in the brake rigging and in the brake shoes themselves. For application to existing equipment, little change is necessary except in the size of brake cylinders.

Experience with more than 36,000,000 brake-shoe miles indicates a Cobra Shoe life of about three times that of cast-iron shoes. Wheel wear is also reduced. The Cobra Shoe wears evenly and produces a highly polished wheel tread. In subway service the result has been a noticeably quieter ride and an absence of noise and vibration when the brakes are applied.—Railroad Friction Products Corporation, Wilmerding, Pa.

Fire Extinguisher Cart

This cart is a device for stationing various combinations of dry chemical, carbon dioxide and vaporizing liquid type extinguishers at their strategic locations and for transporting them quickly to the scene of the fire. There is no lifting from wall hangers. It is said to be of great advantage where women are trained to operate extinguishers.

The cart is useful when it is necessary for one man to fight a fire. He is able to transport three extinguishers instead of one. Height of the extinguisher hanger is adjustable so that the cart may be made to hold a variety and types of extinguishers.

Height is 46 in.; floor space required, 14 by 21½ in., and diameter of wheels, 10 in. The cart is finished in a black enamel body and red enamel wheels. American-La-France-Foamite Corporation, Elmira, N.Y.

(More on page 10)



Quick low-cost delivery of chilled car wheels from the AMCCW plant near you



When you order chilled car wheels for freight car service, you gain two ways: a lower inventory with its correspondingly lower investment; and minimum "foreign" freight charges.

You save *both* ways when you use AMCCW chilled car wheels.

All AMCCW plants produce the improved car wheel with more brackets to give thicker, heavier, more continuous flange support . . . and with a heavier tread on both rim and flange sides.

Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling

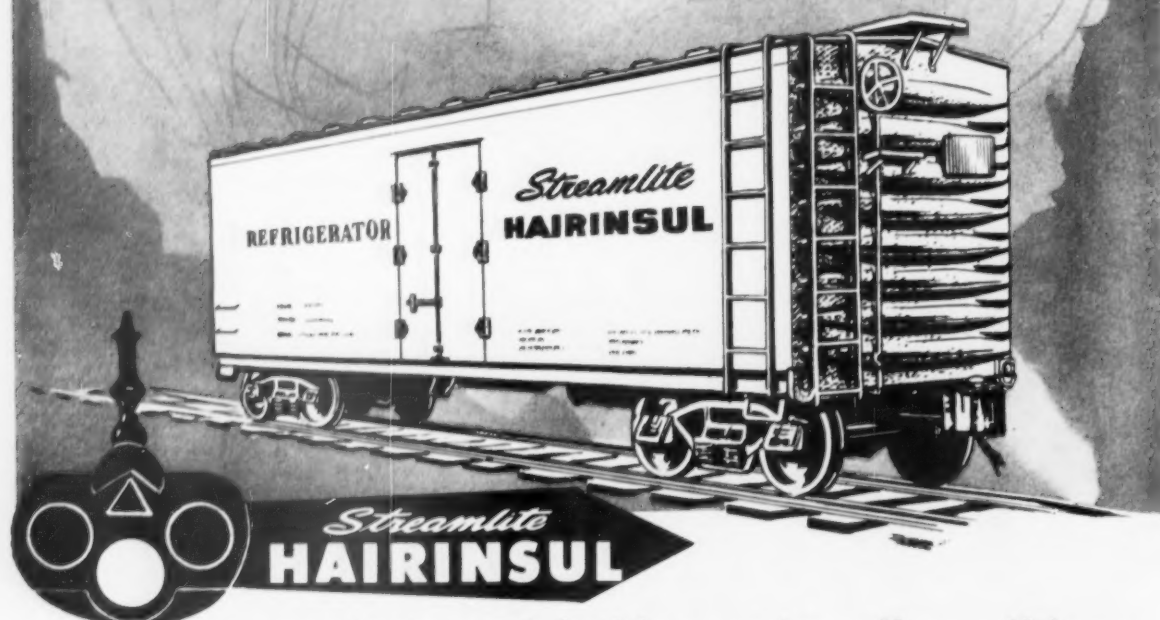


Association of Manufacturers
of Chilled Car Wheels

445 North Sacramento Boulevard, Chicago 12, Ill.

Albany Car Wheel Co. • ACF Industries, Inc. • Marshall Car Wheel & Foundry Co. • Griffin Wheel Co. • Pullman-Standard Car Mfg. Co.
Southern Wheel (American Brake Shoe Co.)

chart your own WEATHER CONTROL



protects perishables under all conditions

- **LOW CONDUCTIVITY.** Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity — .25 btu per square foot, per hour, per degree F., per inch thick.
- **LIGHT WEIGHT.** Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.
- **PERMANENT.** Does not disintegrate when wet, resists absorption. Will not shake down, is fire-resistant and odorless.
- **EASY TO INSTALL.** Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall sections between fasteners.
- **COMPLETE RANGE.** STREAMLITE HAIRINSUL is available 1/2" to 4" thick, up to 127" wide. Stretched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings are available.
- **HIGH SALVAGE VALUE.** The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.

Shipments of valuable perishables are at the mercy of extreme temperature changes unless properly protected. Only an efficient refrigerator car insulation can reduce this hazard.

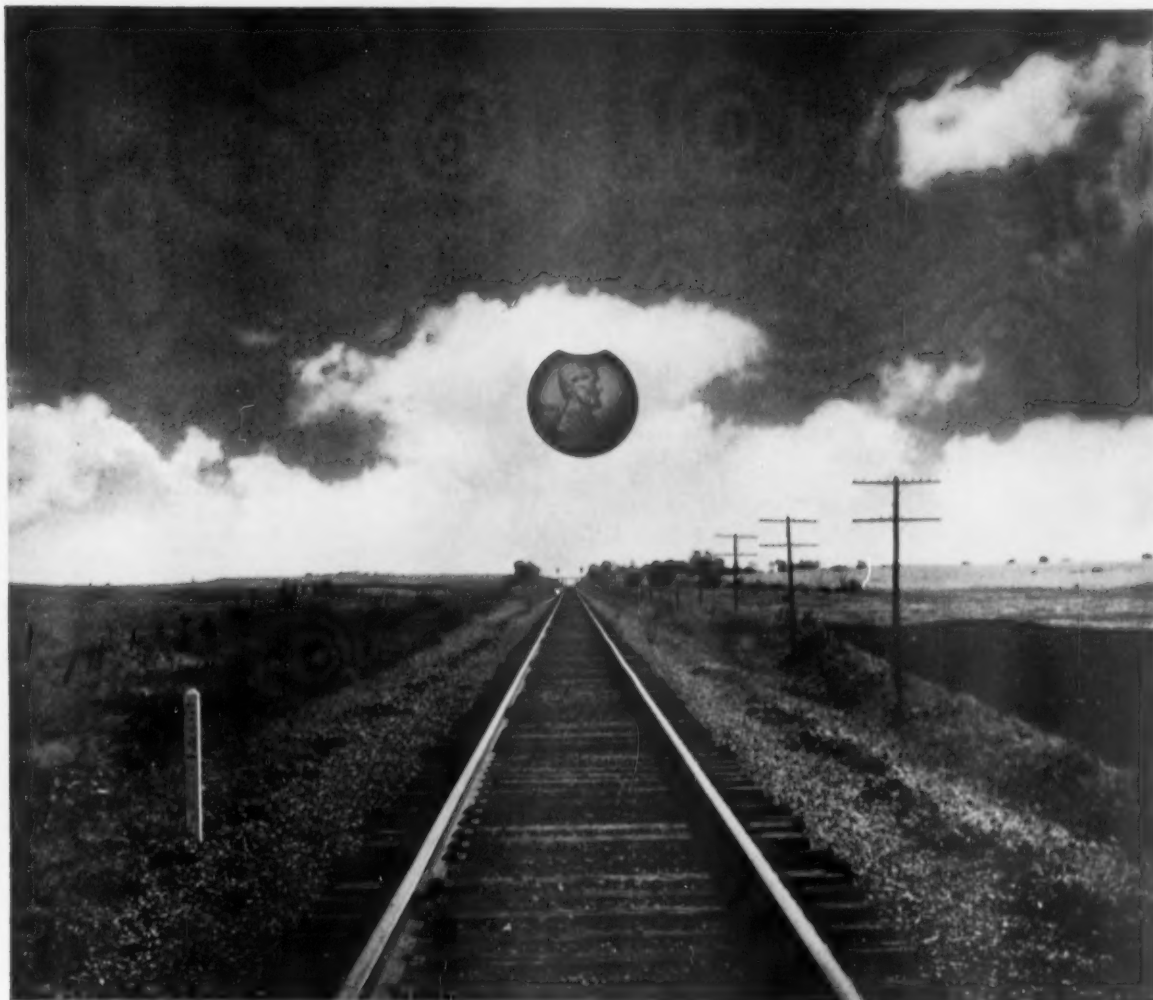
Leading refrigerator car builders recognize this. That is why, for the better part of a century, they have been specifying all-hair insulation. They know that STREAMLITE HAIRINSUL is the one insulation that is fully efficient under all weather conditions — hot or cold — no matter how severe.

Other reasons why car builders specify STREAMLITE HAIRINSUL are listed at the right. These are just a few — there are more. Write for complete data.

MERCHANDISE MART, CHICAGO 54



SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED



under 1¢ a mile

That is the repair parts cost record established by the Fairbanks-Morse 2400-Horsepower Opposed-Piston engines in railroad service. That's the meaning of 40% fewer parts in the O-P.

How? The *simple* O-P 2-cycle design eliminates 40% of the moving parts found in comparable diesels. These are parts in other engines that need servicing, adjusting . . . they wear and must be replaced.

Conservative rating of 200 horsepower per cylinder is the same as the first O-P that entered railroad service more than 10 years ago.

This is the engine that powers the

TRAIN MASTER

It is another reason why TM is your best motive power investment. Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois



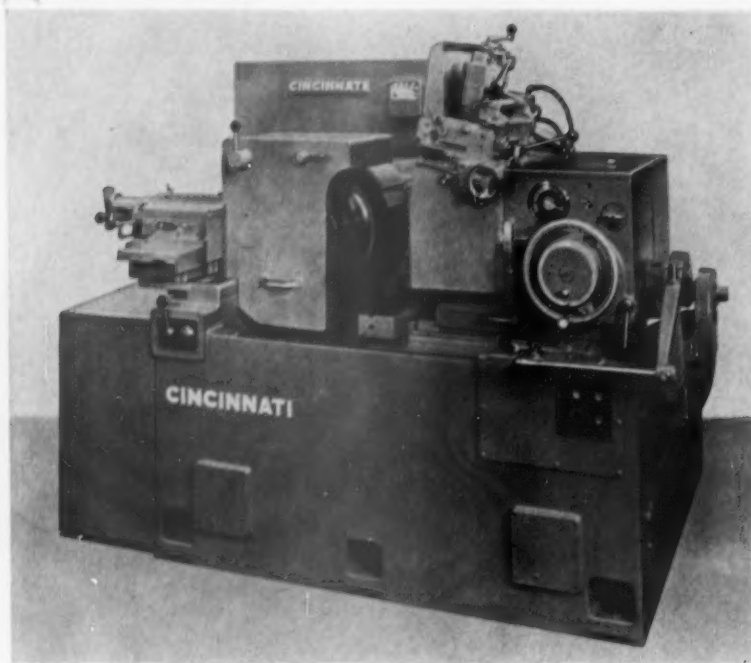
FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES, ENGINES • RAILCARS, RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS

EQUIPMENT... *New Ideas—New Uses*

(Continued from page 6)



Centerless Grinding Machine

Designated the No. 2, this centerless grinding machine is more than 1000 lb heavier than its predecessor and incorporates many new features. Filmatic bearings have been retained for the grinding wheel spindle. They are self-adjusting for all conditions imposed by the grinding action; automatically lubricated with filtered oil from

a circulating system, and protected with an electrical pressure switch.

A lower slide unit, mounted on bed ways at right angles to the grinding wheel spindle, supports an upper slide unit which carries the regulating or feed wheel. Way bearing surfaces are well guarded to exclude grit and cutting fluid. To com-

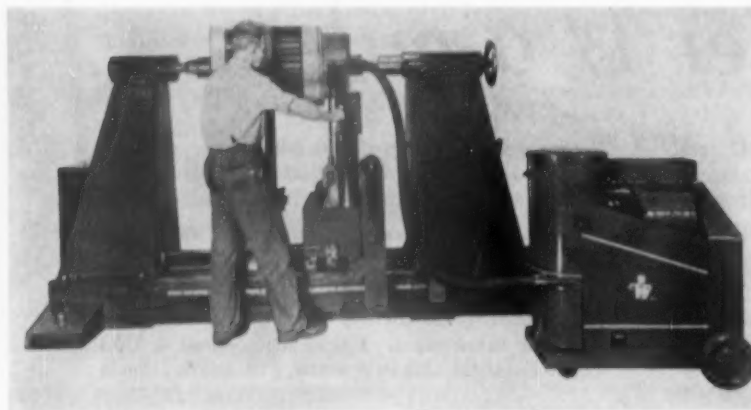
pensate for slight errors in truing or in setup, the entire regulating wheel pile may be swiveled slightly on the bed.

The regulating wheel is driven by a built-in 1½-hp motor through a back gear combination and a wide V-belt. Regulating wheel speeds are infinitely variable, within two ranges, from 11 to 320 rpm. Speed changes are accomplished with variable pitch sheaves, handwheel selected and indicated on a large tachometer dial at the operator's working position.

Power operated profile truing is standard equipment for the grinding wheel. It is actuated by a hydraulic motor at one end of the unit. Two external controls are located on the operating side of the bed, one to engage rapid and truing rates and change the direction of traverse, and the other control to change the rate of traverse.

The infeed handwheel for size adjustment and positioning the slides when setting up the machine is located on the upper slide, at the operator's working position. It incorporates a 0.0001 in. graduated dial and a 0.001 in. graduated dial. The motor and electrical controls are completely enclosed and the device is wired to comply with J.I.C. standards. Push-buttons are located on the front of the bed and electrical controls are contained in a sheet metal unit at the rear of the machine, equipped with a safety interlock and a loadmeter to show percent of available grinding wheel horsepower being used during the grinding cycle.

A wide variety of standard fixtures and attachments are available. Included among them are several types of work rests, long bar grinding attachments, automatic electro-hydraulic and roto-infeed attachments, automatic and hand grinding wheel spindle reciprocation, feedmatic hoppers, etc. Cincinnati Grinders, Inc., Cincinnati 9.



Undercutter With Sensing Head

The Type M sensing head has been developed for use in conjunction with the type DS undercutter for the purpose of converting the device into a fully automatic

machine for slotting of free end commutators. When attached to the undercutter, the device acts on the commutator to locate the mica segment for alignment with the

cutting saw by exercising control over a power rotator which turns the armature being serviced.

The type DS undercutter is primarily designed for use in a diesel repair shop for undercutting commutators of traction motor and generator armatures. The unit will support armatures having a maximum diameter of 60 in. with a maximum shaft length of 72 in. and a maximum weight of 9,000 lb.

The basic principle on which the automatic sensing device operates is that a circuit is established through the commutator by employing a carbon brush which spans a number of bars for establishing a common contact. A pointed element bearing on the commutator surface is designed to break a relay circuit when, with the armature turning, a mica segment passes under the point. With the relay circuit broken, the armature rotating motor is caused to stop. Hence, with the stopping point located so that a mica segment will come to rest directly in line with a cutting saw, it becomes possible,

(Continued on page 16)



The famous General became a prize of war during the Civil War when she was captured at Big Shanty, Ga. However, after a hair-raising 90-mile chase, she was recaptured by two intrepid railroad men with the assistance of Confederates. She remained in special service well into the 1890's.



Then...and now...serviced with Esso Railroad Products

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad Products.

Diesel Fuels
ESSO ANDOK Lubricants—
versatile greases
ARACAR—journal box oils
ARAPEN—brake cylinder
lubricant
ESSO XP Compound—hypoid
gear lubricant

DIOL RD—Diesel lube oil
COBLAX—traction motor gear
lube
VARSOIL—Stoddard Solvent
SOLVESSO—Aromatic solvent
ESSO Weed Killer
ESSO Hotbox Compound
AROX—pneumatic tool lube

CYLESSO—valve oil
ESSO Journal box compound
Asphalt
Cutting Oils
Rail Joint Compounds
Maintenance of Way Products
Signal Department Products
RUST-BAN—corrosion preventive



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Va. — Charlotte, N. C. — Columbia, S. C. —
Memphis, Tenn. — New Orleans, La.

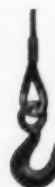
You'll cut handling costs with **ROEBLING** ALL - PURPOSE **SLINGS**

THESE are the easiest-to-handle slings ever put on the market. There are no servings—no bulky sections of rope next to the loop. All wire ends are safely and permanently covered by the tapered sleeve. And on top of that, these slings are remarkably flexible, *doubly* safe, and real time-savers on the big majority of lifting jobs.

Roebling All-Purpose Slings come to you ready for work. They cost less than most other slings and they're a cinch to order. They have the full catalog strength of the "Blue Center" steel wire rope with I.W.R.C. from which they're made, assuring maximum sling service life.

Roebling All-Purpose Slings are stocked in standard sizes and lengths for immediate delivery. Order them from your jobber—and write us for descriptive folder. John A. Roebling's Sons Corporation, Trenton 2, N. J.

You can have these slings with a tapered sleeve attachment with a heavy steel galvanized thimble plus the following attached fittings:



Drop Forged Steel
Weldless Hook



Drop Forged
Weldless Shackle



Weldless
Link



ROEBLING



Subsidiary of The Colorado Fuel and Iron Corporation

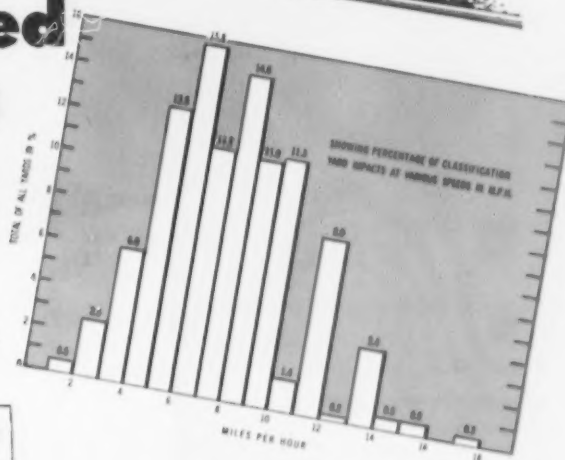
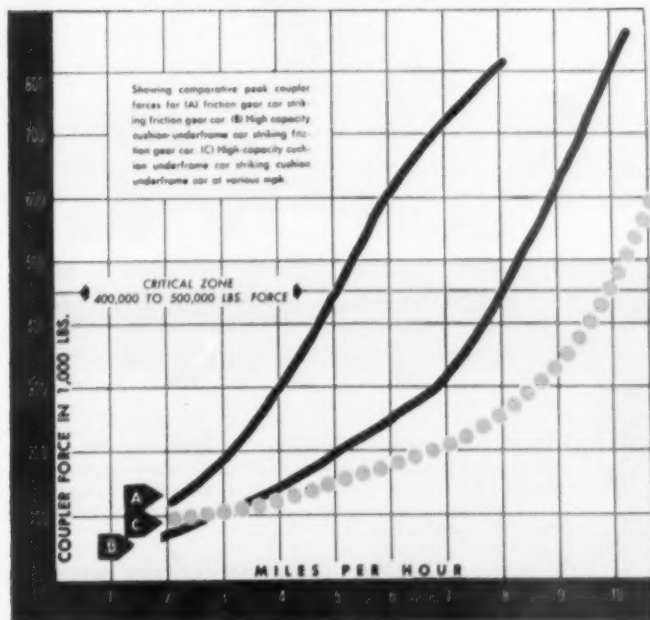
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need the high-speed
impact protection
of **WAUGH**

HIGH CAPACITY
Cushion Underframe



In consequence of today's accelerated railroad freight operations, cars in classification yards, frequently coupling at 6, 8, 10, mph, take a terrific beating. The number of these coupling impacts made at speeds above the 4 mph friction-gear average safe-speed limit are far greater than are the impacts at speeds below 4 mph.

This modern high-speed freight car operation makes modern high-capacity cushioning a prime essential. To protect cars from structural damage and repair, and to protect lading, equip all new cars with the Waugh High-Capacity Cushion Underframe.

Note the curve in the graph. Here is the record of carefully instrumented comparative tests which shows conclusively the extra protection afforded by the Waugh High-Capacity Cushion Underframe.

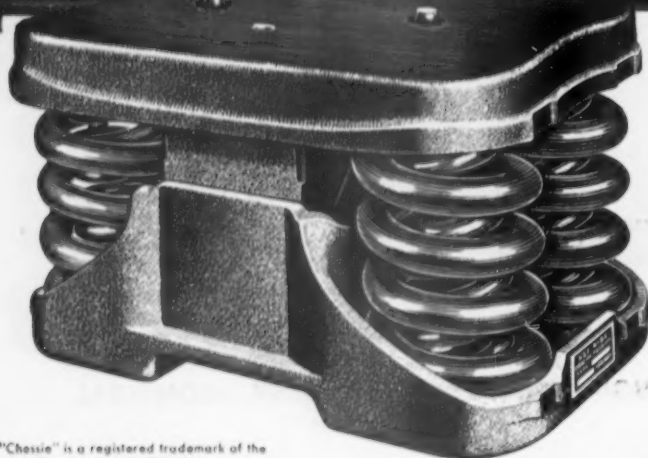
90,000 FT. LBS. of protection

Inquiries invited

WAUGH EQUIPMENT COMPANY 420 Lexington Ave., New York 17, N. Y.
CHICAGO • ST. LOUIS • CANADIAN WAUGH EQUIPMENT COMPANY, MONTREAL

On the Chesapeake and Ohio, 6000 older cars are being equipped with ASF Ride-Control® Packages . . . so that

Now even "Chessie"®



"Chessie" is a registered trademark of the Chesapeake and Ohio Railway

The C&O is on record as being "... vitally interested in any plan that will move more goods, more efficiently." They found one answer in the self-contained, easy-to-install Ride-Control Package. In minutes, the Package-equipped car is ready to roll—almost as smoothly as a brand-new car on Ride-Control Trucks!

**TEST RUNS—BEFORE AND AFTER PACKAGE INSTALLATION—
SPEAK FOR THEMSELVES!**

LOADING DAMAGE INDEX: 45,877

Car loaded on old-type coil springs. Speed: 56 mph.

**LOADING DAMAGE INDEX:
3,085**

Same car equipped with Ride-Control Packages. Speed: 84 mph.



can ride their freights!



"Chessie" has long been a symbol of smooth, safe travel on crack C&O passenger fleets. Today, more than ever before, the same applies to their freight service.

Current modernization on the C&O calls for bringing some 6000 older cars up to modern riding standards with ASF Ride-Control Packages. Result: cars that ride over fifteen times more smoothly!

But aside from the obvious mechanical advantages is the equally important question of economics.

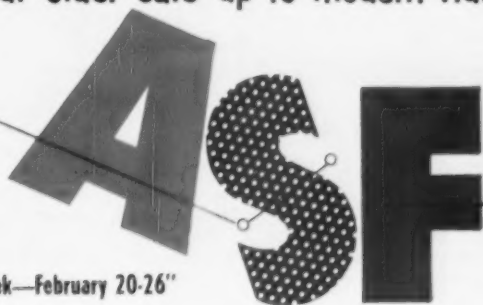
In deciding to use Packages extensively, the C&O considered the fact that a car available only for restricted use represents a potential revenue loss . . . that a more efficient car pool is the answer to carrying more freight per dollar invested in rolling stock . . . that safer

hauls at higher speeds build traffic.

Not all older cars are equipped with Packages, of course. Some are so close to retirement that they don't justify even this small an investment. So each older car is evaluated as to its over-all condition. In short, the C&O Package program is sound economics in practice as well as in theory.

Would a similar program be practical on your road? *The facts prove that it's worth investigating.* Now is the time to find out why a small per-car investment in Ride-Control Packages can pay you big returns!

Bring your older cars up to modern riding standards . . . with



Ride-Control® Packages

AMERICAN STEEL FOUNDRIES

410 N. Michigan Avenue, Chicago 11, Illinois

Canadian Sales: International Equipment Co., Ltd.,
Montreal 1, Quebec

"Engineering in Steel—Engineers' Week—February 20-26"

EQUIPMENT...New Ideas—New Uses

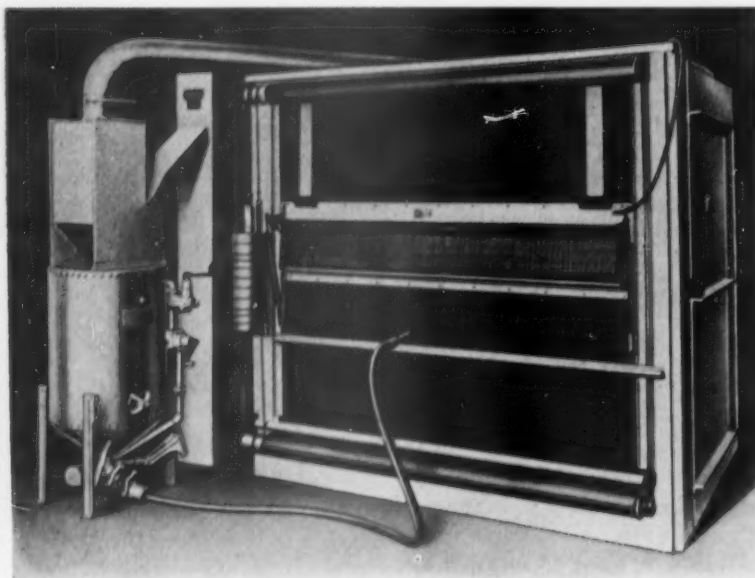
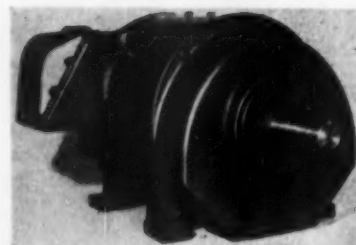
(Continued from page 10)

through a relay circuit, to have the cutting saw make a traverse between limits for the purpose of removing the mica between the copper segments.

The distance that the cutting saw will travel is controlled by the positioning of the carriage on the ways of the machine and an adjustable stop which is clamped on one of the ways.

The head consists of a 2-in. sq aluminum

tube which carries on the commutator a series of contacts designed for establishing an electrical circuit through the commutator which controls the rotation of the armature. Sequence of operations is controlled by a relay network with relay elements designed to be mounted on the undercutter in a metal enclosure. *Electric Service Manufacturing Co., 17th and Cambria Streets, Philadelphia 32, Pa.*



Armature Cleaning Machine

An armature cleaning machine now being made for the railroads utilizes a shellblast abrasive to clean the rotors and other parts of motors and electric generators for diesel locomotives while undergoing repairs. The equipment illustrated includes a sanitary-type steel room, with operator's protective curtain, and fitted with three 150-watt electric lights. This apparatus completely encloses the soft grit shellblasting operation and affords the operator complete accessibility to the work, adequate illumination on the blast zone, as well as full protection from rebounding abrasive.

The primary blasting unit includes a direct-pressure generator, compressed air operated, which delivers crushed walnut shell through a 1-in. supply hose to a 5/16-in. discharge nozzle. The operator directs the nozzle at the diesel armatures through the protective curtain shown.

The discharged shellblast compound falls to the floor, enters a V-shaped hopper where a mechanical screw conveyor picks up the material, passes it through a screening device and automatically recharges the blast generator with shellblast compound.

This continuous operation assures a continuous supply of shell compound to the nozzle.

The dust and dirt created by the shellblasting operation is removed by means of a Ruemelin No. 755 tubular cloth-type dust filter, connected by suitable piping to the blast room and elevator system. A fan, driven by a 5-hp motor, keeps the entire blasting operation under negative draft at all times. The dust filter suppresses all fine dust particles. This shellblasting equipment is said to eliminate the use of obnoxious and toxic cleaning fluids, and effect appreciable time and labor savings. *Ruemelin Manufacturing Company, 3861 N. Palmer street, Milwaukee 12.*

Industrial D-C Motors

These new motors are described as producing the fastest and most accurate response ever offered in a standard design unit, and are reported to be twice as effective in many applications as any other motor now produced. Called the Super T, the con-

trolled reaction of the motors to the demand for a change with a dynamic response formerly found in specially designed machines is standard of performance.

Dynamic response is described as the fundamental feature of the unit. It also features ruggedness, ability to take full loads and overloads, ability to change speeds rapidly, ability to maintain torque and tension, and reverse and stop quickly.

The line is produced in sizes from 20 to 100 hp, and the range will be extended both upward and downward to lower and higher horsepowers. A complete line of mechanical enclosures has been developed to assure complete protection under severe operating conditions. *Reliance Electric and Engineering Co., 1088 Ivanhoe Road, Cleveland 10, Ohio.*



Fire Extinguisher

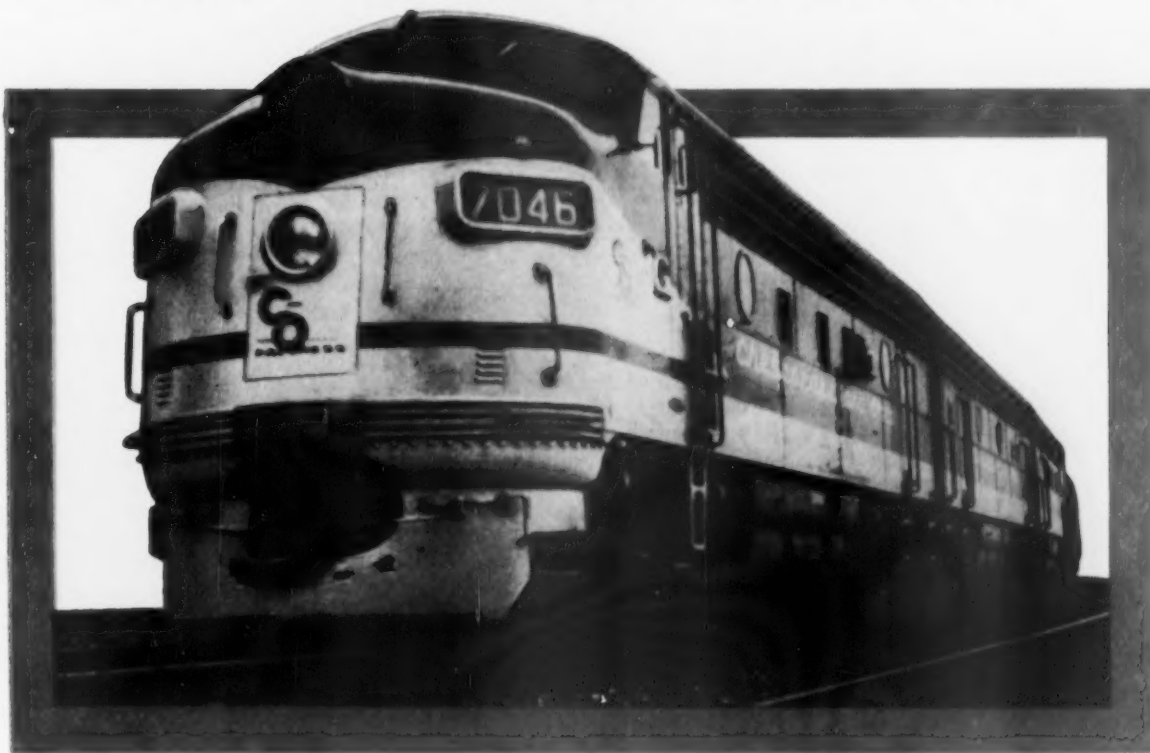
Designed for industrial use, this device is capable of expelling 10 lb of dry chemical against fires in flammable liquids, gases, chemicals and electrical equipment. Its light overall weight of 22 lb, and simplicity of operation makes it suitable for use by inexperienced personnel according to the manufacturer.

Designated the Ansul 10, it should fill a need for an extinguisher with a capacity between the manufacturer's 4 lb and 20 lb capacity models. The unit is equipped with a CO₂ pressure cartridge to activate discharge of the dry chemical. Other design features include a fill cap that is considered more effective in keeping moisture out of

(Continued on page 88)

The **modern** Chesapeake and Ohio Railway
uses the **modern** Diesel Locomotive Lubricant—

GULF DIESELMOTIVE OIL



Over \$460 million has been put into plant improvements since the war to make the progressive Chesapeake and Ohio one of the most modern railroads in America. The modernization program includes a system of centralized traffic control, new mechanical track maintenance equipment, and additional powerful Diesel locomotives.

Many of the C&O's modern Diesel locomotives are lubricated with Gulf Dieselmotive Oil—the modern Diesel locomotive lubricant that contributes to better performance, greater availability, and lower maintenance costs.

Here's why:

1. Effective detergent action prevents harmful piston ring belt deposits.
2. Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.

3. 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today for this expert lubrication assistance.

Gulf Oil Corporation • Gulf Refining Company

1822 GULF BUILDING, PITTSBURGH 30, PA.



Solid bearing freight cars give **\$250,000 EXTRA** on each 1000-car

*You get from 6.25% to 10% more income from
your investment when cars are solid bearing
equipped—regardless of traffic conditions.*

ALL labor and material costs for solid bearing operation, including overhead expense, come to less than the fixed charges on the huge investment necessary for non-standard bearings. That's established when you analyze the University of Illinois study of journal bearing operation* in the light of high initial roller bearing costs.

But the University also included costs for car delay days, based on problematical earnings and ownership costs. According to the University, the earnings presumed to be lost because of delay days constitute a significant percentage of the total costs for solid bearing operation.

How Problematical Earnings Prove The Case for Solid Bearings

When you talk about problematical earnings, you've got to relate them to *return on a prospective investment*, and not just to costs for an investment already made. That's the basis for all sound business procedure. Let's look at a case in point.

Suppose you're an average railroad with a given amount of money you can spend for *needed* freight equipment now. Say that the money you have is \$6,600,000.00.

Now let's further suppose that the average freight car costs \$6,000.00, and that this car could be equipped with roller bearings for only \$600.00 additional. For the money on hand you could then buy 1100 solid bearing cars or 1000 roller bearing cars.

Do you want to know what the *loss* on the roller bearing investment would be? Here's a rule-of-thumb to figure it. Still assuming these 100 extra cars are needed, each of them will produce annual revenue of \$4,000.00,** or a total of \$400,000.00 per year. Then from this sum you subtract the difference, if any, in maintaining and operating journal assemblies on 1100 solid bearing cars as opposed to 1000 roller bearing cars.

Applying the Rule-of-Thumb to a 1000-Car Investment

But the costs for roller bearing maintenance and operation on freight cars are unknown. However, from the University of Illinois report we learn that solid bearing operating costs (including all delay day costs for periodic maintenance and train inspection, as well as hot boxes) range between \$7.59 and \$8.53 per 1000-car-miles.*** If each car accumulates 16,800 miles per year, maximum annual solid bearing operating costs would be \$8.53 x 16.8 x 1100, or \$157,634.40. Thus, your *minimum annual loss* on 1000 roller bearing cars would be \$242,365.60 (\$400,000.00 less \$157,634.40) *plus* the annual expense for skilled labor and materials for roller bearing maintenance on 1000 cars, and *plus* also any loss of revenue sustained because of delay days due to roller bearing failures, maintenance and inspection, etc. Conservatively, if you specify solid bearings you gain from \$250,000.00 to \$400,000.00

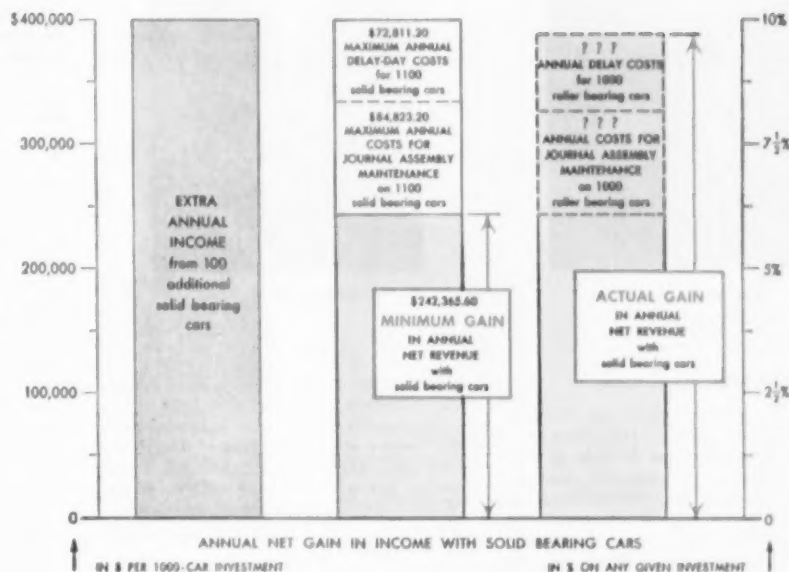
*University of Illinois Engineering Experiment Station, Bulletin Series No. 406: *An Economic Investigation of Solid Journal Bearing Operation in Freight Service on Two Large Class I Railways*; February, 1953.

**According to American Railway Car Institute, average revenue per freight car in 1953 was \$4,351.00, and the average cost of all maintenance per car, including journal assemblies, was \$350.65.

***These costs, while used here, are probably too high. See Magnus Bulletin No. 2068-68.

equivalent of REVENUE PER YEAR investment

The left-hand column shows the average extra annual revenue that can be obtained by buying 1100 solid bearing freight cars instead of 1000 roller bearing cars. The middle column graphically subtracts from this extra revenue all solid bearing operating costs on 1100 cars, and the remainder represents the minimum gain in net revenue that would result if roller bearings could eliminate all maintenance, delay, and failure costs. To determine the actual annual net gain, this minimum net gain should be increased by the unknown amount of the costs for roller bearing operation on 1000 cars, as indicated in the right-hand column. The reference line at the right indicates the percentage increase in return with solid bearings that can be anticipated for any given car investment.



for each year of operation, increasing your income at least 6.25% and possibly as much as 10%.

By the same token, suppose you only need 1000 cars to meet your traffic requirements. With solid bearings, you reduce your initial costs by \$600,000.00 and you get the same proportionate increase in return per dollar of car investment represented by the \$250,000.00 to \$400,000.00 above. And since both freight revenues and bearing operating costs are proportionate to car use, this comparative increase in return with solid bearings holds true regardless of traffic conditions.

These hard economic facts prove the wisdom of present railroad policy to seek out and adopt the means for bettering solid bearing performance. For

the most part these means are already available. Combine selective adoption of available developments with a program to improve maintenance standards and hot boxes will virtually disappear.

Write us for information about ways to improve journal bearing performance. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS
Solid Bearings

Right for Railroads

...in performance ...in cost



MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

NEWS.....



Vaughn R. Hawthorne

Keller Succeeds Hawthorne

William M. Keller, director of research, Mechanical Division, Association of American Railroads, has become the division's executive vice-chairman and director of research. As vice-chairman he succeeds Vaughn R. Hawthorne, who retired December 31.

Mr. Keller, a native of Pittsburgh and an engineering graduate of Pennsylvania State College, entered railroad service in 1919 as apprentice machinist with Pennsylvania. In 1945, he was promoted to assistant mechanical engineer in charge of research. He joined the AAR in 1952.

Mr. Hawthorne, who retired after more than 50 years in the railroad industry was honored at a December 3 luncheon at the Union League Club in Chicago. The luncheon, sponsored by a large group of midwestern supply men, also was attended by many representatives of the Mechanical Division and members of the Locomotive Maintenance Officers Association.

Mr. Hawthorne, 68, entered railway service with the Pennsylvania in 1904. He was appointed acting secretary of the Master Car Builders and the American Railway Master Mechanics Associations in 1918. From 1919 to 1940 he was secretary of the Mechanical Division, and in 1941 became executive vice-chairman.

Metallizing to Build Up Axles Gets ICC Frown

The Interstate Commerce Commission has indicated its view that use of "metallizing" to build up worn axles is akin to use of fusion welding, which is a method of reclamation "not in accordance with recog-



William M. Keller

nized practice of the Association of American Railroads."

The commission has also suggested that the "severe service conditions" to which axles and wheels on diesel-electric locomotives are subjected may well point up "a need for more frequent testing and determination of a safe life expectancy for such axles."

These expressions of the commission were in a report (No. 3594, by Commis-

sioner Clarke) on its investigation of the September 22 derailment of the Santa Fe's Train No. 2, the "San Francisco Chief," near Orwood, Cal. The commission found that a broken axle caused the accident, which resulted in injury to 40 passengers, 18 dining-car employees, and one train-service employee.

The axle was part of a driving-wheel set on the third unit of the train's four-unit diesel-electric locomotive. The break which caused the derailment was at one of the journals, and the axle was also cracked in the adjacent wheel seat. Laboratory tests of the axle material "indicated that the chemical composition met the specification requirements, but the yield strength was below the minimum specification requirement," the commission said.

Since it had first been placed in service, wheels had been remounted on the axle four times, the last at 994,373 miles of service. "The failed journal," the report said, "had been built up by use of the metal spraying process which extended into the fillet. This metallizing had broken from the axle surface near the fractured face." In either the metallizing or fusion-welding processes, the report said, "concealment of any existing surface defects is equally effective."

Meanwhile, however, the commission conceded that its investigation in the present case left it unable to determine whether



E. L. WOODWARD (left) is now Pacific Coast editor, *Railway Locomotives and Cars*, at Los Angeles, Cal. G. J. WEIHOFEN (right) succeeds Mr. Woodward as western mechanical editor at Chicago. Mr. Woodward, a graduate of Massachusetts Institute of Technology (B.S. in E.E. 1911), started his railroad career on the Boston & Maine and worked on the New York Central before coming with Simmons-Boardman as associate editor, *Rail-*



way Mechanical Engineer (now *Railway Locomotives and Cars*). For two years (1918-19) he was with the Railway Engineers Corps, U.S. Army, and since 1923 has been western mechanical editor at Chicago. Mr. Weihofen, a graduate of Purdue University (B.S. in M.E. 1940), was with the Erie for three years and came to Simmons-Boardman in 1946 as associate editor, *Railway Mechanical Engineer* after three years' in the U. S. Navy.

there were any incipient defects at the time the metallizing was applied.

The "recognized practice" of the AAR to which the report referred is the rule that condemns restoring worn-out axles to original size by welding with the exception of building up the end collars. Also cited was a previous commission pronouncement which called use of fusion welding on axles a "pernicious practice." The suggestion that axles on diesels should be tested more frequently came at the end of the commission's report, preceded by this comment:

"The axle which failed had during its service life had five pairs of wheels mounted upon it and had accumulated nearly one and one-third million service miles prior to failure. Development of the progressive fracture that culminated in failure of the journal and of the progressive fracture in the adjacent wheel seat strongly indicates that the axle had been continued in service beyond the endurance limit of the metal."

Southern To Enlarge Hayne Car Shop

The Southern will spend \$1,500,000 to enlarge and improve its box-car rebuilding facilities at Hayne Car Shop, near Spartanburg, S. C.

Lester N. Selig Elected President of Car Institute

The American Railway Car Institute has elected Lester N. Selig, of Chicago, as president. Mr. Selig, who will serve without compensation, succeeds Gustav Metzger, who has retired after serving two years as full-time head of the institute.

The new president of ARCI has spent his entire business life with General American Transportation Corporation. A native of Brooklyn, he began as a workman in the shops of the company of which he is now chairman of the board.

Diesel's Fuel-Cost Showing Still Tops

Diesel-electric freight locomotives in 1954 produced 80% more gross ton-miles per dollar of fuel expense than coal-burning steam locomotives or electrics. On the same basis, the diesels' output was nearly three times that of oil-burning steam locomotives.

That showing was indicated by figures for the first nine months of 1954 which were published in the "Monthly Comment" of the Bureau of Transport Economics and Statistics of the ICC.

The nine-months' figure for diesels showed that they produced 5,371 gross ton-miles per dollar of fuel expense. Comparable figures for other types of motive power were: Coal-burning steam locomotives, 2,952; oil burners, 1,849; electrics, 2,903.

The 1953 figures were higher for all types of motive power except coal burners.

The bureau explained that this reflected "in no small degree" changes in the unit cost of fuel. Only coal, down 2.2% from \$5.52 per net ton to \$5.40, was cheaper in 1954 than in 1953. Fuel oil was up 18.8%, from \$1.65 per barrel to \$1.96; diesel fuel rose 1.7% from 9.9 cents per gallon to 10.07 cents; and electric current was up 6.8%, from 1.088 cents per kilowatt hour to 1.162 cents.

The bureau's figures also showed that diesels performed 84.2% of the freight service (as measured by gross ton-miles) on Class I railroads in the first nine months of 1954. That was an increase from 73.9% in the first nine months of 1953. Meanwhile, the coal burner's share was down from 19.2% to 11.8%, the oil burner's share dropped from 5.1% to 2.1%, and the electric's share was up from 1.8% to 1.9%.

GN Opens New Diesel Shop at Spokane

A two-day civic celebration at Spokane, Wash., marked the opening of the GN's new diesel locomotive shop there.

The new facility known as Hillyard diesel shop was reconstructed from the shell of a former steam locomotive shop as part of a \$675,000 modernization program. In place of steam locomotive pits are four service tracks, plus three tracks leading to a 16-ft pit containing a 100-ton drop table for locomotive truck replacement. A total of 40,000 sq ft of floor area have been renovated; new lunchroom, locker room and shower and toilet facilities provided; and an office set up for the assistant shop superintendent. Illumination is largely fluorescent.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.	Month of October		10 months ended with October	
	1954	1953	1954	1953
3 Road locomotive miles (000) (M-211):				
3-05 Total, steam	6,335	12,185	62,547	124,165
3-06 Total, Diesel-electric	34,547	33,184	323,832	312,552
3-07 Total, electric	674	732	6,483	7,304
3-04 Total, locomotive-miles	41,806	46,106	394,283	444,701
4 Car-miles (000,000) (M-211):				
4-03 Loaded, total	1,667	1,776	15,090	16,758
4-06 Empty, total	904	964	8,792	9,177
6 Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01 Total in coal-burning steam locomotive trains	13,513	23,086	125,854	225,675
6-02 Total in oil-burning steam locomotive trains	2,716	6,123	22,969	60,226
6-03 Total in Diesel-electric locomotive trains	97,383	93,504	895,810	875,186
6-04 Total in electric locomotive trains	2,076	2,113	19,920	20,769
6-06 Total in all trains	116,510	125,116	1,069,462	1,184,107
10 Average per train-mile (excluding light trains) (M-211):				
10-01 Locomotive-mile (principal and helper)	1.02	1.03	1.02	1.03
10-02 Loaded freight car-miles	42.80	41.60	41.00	40.80
10-03 Empty freight car-miles	23.20	22.60	23.90	22.40
10-04 Total freight car-miles (excluding cabooses)	66.00	64.20	64.90	63.20
10-05 Gross ton-miles (excluding locomotive and tender)	2,980	2,932	2,905	2,887
10-06 Net ton-miles	1,352	1,342	1,288	1,315
12 Net ton-miles per loaded car-mile (M-211)	31.60	32.20	31.40	32.20
13 Car-mile ratios (M-211):				
13-03 Per cent loaded of total freight car-miles	64.80	64.80	63.20	64.60
14 Average per train hour (M-211):				
14-01 Train miles	18.40	18.00	18.70	18.10
14-02 Gross ton-miles (excluding locomotive and tender)	54,375	52,095	53,844	51,765
14 Car-miles per freight car day (M-240):				
14-01 Serviceable	45.50	47.50	42.60	45.90
14-02 All	42.50	45.20	40.10	43.70
15 Average net ton-miles per freight car-day (M-240):	872	945	797	908
17 Per cent of home cars of total freight cars on the line (M-240)	69.70	44.80	53.20	66.1

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

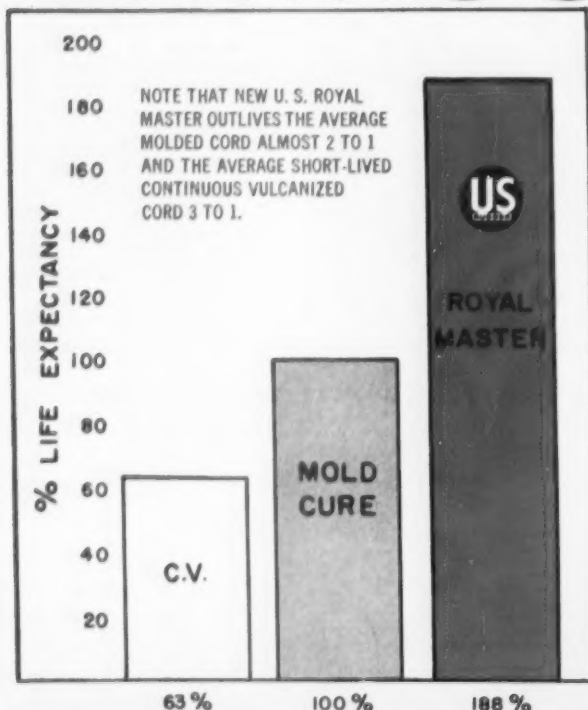
3 Road motive-power miles (000):				
3-05 Steam	1,848	3,150	22,844	42,420
3-06 Diesel-electric	20,969	20,745	208,895	201,820
3-07 Electric	1,347	1,475	13,856	15,278
3-04 Total	24,165	25,371	245,597	259,520
4 Passenger-train car-miles (000):				
4-08 Total in all locomotive-propelled trains	241,462	254,532	2,465,241	2,620,631
4-09 Total in coal-burning steam locomotive trains	8,821	16,095	112,101	236,003
4-10 Total in oil-burning steam locomotive trains	7,282	11,996	85,894	147,420
4-11 Total in Diesel-electric locomotive trains	210,490	209,989	2,113,932	2,067,638
12 Total car-miles per train-mile	9.60	9.64	9.66	9.77

YARD SERVICE (DATA FROM I.C.C. M-215)

1 Freight yard switching locomotive-hours (000):				
1-01 Steam, coal-burning	292	598	3,095	5,979
1-02 Steam, oil-burning	56	89	544	1,068
1-03 Diesel-electric	3,425	3,598	32,814	34,504
1-06 Total	3,781	4,305	36,542	41,749
2 Passenger yard switching hours (000):				
2-01 Steam, coal-burning	10	17	118	201
2-02 Steam, oil-burning	6	6	51	65
2-03 Diesel-electric	254	258	2,540	2,560
2-06 Total	269	313	2,969	3,148
3 Hours per yard locomotive-day:				
3-01 Steam	5.00	7.30	4.80	6.90
3-02 Diesel-electric	15.10	16.30	14.90	16.30
3-05 Serviceable	14.70	15.20	14.40	15.00
3-06 All locomotives (serviceable, unserviceable and stored)	12.70	13.60	12.30	13.20
4 Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.59	1.69	1.69	1.72
5 Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	76	76	75	74

*Excludes B and trailing A units.

Now... **88%** longer **U.S. ROYAL**



Chart—summarizing individual service factors weighted by their contribution to overall service life — shows new U. S. Royal Master Cord gives 88% longer life than the average of competitive molded cords.

LOOK FOR THE NAME—

U.S. ROYAL MASTER



Superior on every count!*

- **33.3% greater heat resistance**
- **55.7% greater impact strength**
- **53.8% greater abrasion resistance**
- **30.6% greater resistance to cutting**
- **110.3% greater resistance to tearing**
- **21.2% greater tension or breaking strength**
- **23.3% greater oil resistance**
- **128.8% greater flexibility**

*to the average of molded cords of other makes



UNITED STATES
ELECTRICAL WIRE AND CABLE DEPARTMENT

cord life—with NEW MASTER portable cord!

Far outlasts any other cord made!

Service to cost ratings show new U. S. Royal Master Cord actually gives \$1.88 in value for every cord dollar when compared to the average competitive molded cord!

Two years ago, "U. S." engineers began a *complete reexamination* of portable cord construction, service life, and the causes of cord failure.

Over 10,000 tests were made. More than a thousand cords of all leading makes, including our own famous U. S. Royal Cord, were analyzed, tested, and compared.

Every life factor was considered and carefully evaluated, alone and in its relation to overall cord performance and service life.

Backed by 64 years of experience in the manufacture of electrical wire and cable, U. S. Rubber engineers then translated their findings into an entirely new portable cord, designed to surpass any other previously made.

Extensive tests, both in the laboratory and in outside plant installations have proved this new portable cord startlingly superior in every respect!

New U. S. Royal Master is unquestionably the finest cord you can buy!

From every standpoint, new U. S. Royal Master is a finer, more durable cord — actually gives 88% longer life than the average of other molded cords — far longer than *any* other cord — surpassing even a *hypothetical* cord incorporating the best features of all those tested!

Far greater value, too! In spite of almost doubled service life, this great new cord is in the same price category as other molded cords—giving you \$1.88 in cord value for every cord \$1.00!

Prove to yourself the outstanding superiority of new U. S. Royal Master Portable Cord—in both service life *and* economy! Write address below for FREE descriptive booklet illustrating the superiority of the U. S. Royal Master Cord. And get in touch with your "U. S." distributor today!

Approved by Underwriters' Laboratories, Inc.

RUBBER COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

PERSONAL MENTION



E. A. Kuhn



E. C. Ellis



C. D. Allen

Chesapeake & Ohio

Headquarters, Richmond, Va.

E. A. KUHN, superintendent motive power and equipment at Grand Rapids, Mich., appointed general superintendent motive power and machinery, with general supervision over all locomotive and car matters for system. Former position abolished. *Born:* East Radford, Va., May 2, 1897. *Education:* University of Pittsburgh (1920). *Career:* Began on Toronto, Hamilton & Buffalo in 1913. Became special engineer and engineer motive power, New York, Chicago & St. Louis in 1920; assistant engineer motive power in 1929. From 1932-47 member of Advisory Mechanical Committee, C&O. In latter year appointed master mechanic, Pere Marquette, St. Thomas, Ont., and Saginaw, Mich.; in 1947, superintendent motive power, and in 1949 superintendent motive power and equipment of the C&O at Grand Rapids.

E. C. ELLIS, superintendent car department, Southern Region, appointed general superintendent car department, with system-wide supervision over all car matters. *Born:* Huntington, W.Va., October 4, 1892. *Education:* Night high school; Virginia Mechanics Institute (night); Alexander Hamilton Institute. *Career:* Became pipe-fitter helper on the C&O on November 2, 1909. Subsequently served as carman apprentice, coach carpenter; lead truck and platform carpenter; gang foreman; draftsman, motive-power department; general passenger car inspector; supervisor passenger car maintenance and inspection, becoming superintendent car department at Richmond on June 16, 1944.

C. D. ALLEN, superintendent motive power, Southern Region, has had jurisdiction extended to include entire system.

E. R. MAUER, assistant superintendent motive power—engineering, appointed general mechanical engineer. Former position abolished.

P. J. FINCH, assistant to superintendent motive power — diesels, engineering and maintenance, appointed assistant superintendent motive power — diesels. Former position abolished.

Jurisdictions of A. H. GLASS, chief power and fuel supervisor; J. R. BROOKS, supervisor lubrication and supplies; R. J. DEWBURY, general air-brake inspector; D. F. DUNSMORE, electrical engineer, and J. B. ROMAN, shop engineer, extended to cover entire system.

Headquarters, Huntington, W.Va.

E. E. SLACK, supervisor work simplification, appointed assistant superintendent motive power-work simplification and personnel. Former position abolished.

Chicago, Milwaukee, St. Paul & Pacific

Headquarters, Milwaukee

C. E. BARRETT, assistant superintendent car department, appointed superintendent car department.

J. HANSEN, car shop superintendent, appointed assistant superintendent car department.

J. J. DRINKA, district general car foreman, appointed car shop superintendent.

W. C. MAUER, general car foreman, Davies yard, appointed district general car foreman.

D. D. FISHER, assistant district general car foreman in Chicago, appointed general car foreman, Davies yard.

Headquarters, Savanna, Ill.

G. L. WOOD, general car foreman at Minneapolis, appointed assistant district general car foreman.

Headquarters, Minneapolis

J. E. PALMER, assistant foreman at Milwaukee coach yard and car foreman at LaCrosse, Wis., appointed general car foreman.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
February, 1952	2,809,162,871	2,723	6,473	9,196	305,477
January, 1953	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	2,825,563,662	2,111	4,059	6,170	425,537
March, 1953	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953	2,850,752,648	3,383	6,438	9,818	290,350
May, 1953	3,013,610,843	5,892	11,433	17,325	173,945
June, 1953	2,926,001,360	8,537	15,296	23,833	122,771
July, 1953	2,925,317,024	9,342	15,775	25,117	116,467
August, 1953	2,971,020,684	8,638	14,160	22,798	139,319
September, 1953	2,822,223,832	6,083	10,195	16,278	173,376
October, 1953	3,042,558,922	3,863	6,493	10,356	293,796
November, 1953	2,788,773,285	1,987	3,404	5,391	517,301
December, 1953	2,656,063,018	1,581	2,550	4,131	642,958
January, 1954	2,583,485,918	3,082	3,797	6,879	375,561
February, 1954	2,445,214,845	2,953	4,066	7,019	348,370
March, 1954	2,658,757,249	2,196	3,637	5,833	455,813
April, 1954	2,570,518,990	3,079	5,149	8,228	312,411
May, 1954	2,713,511,223	4,416	6,519	10,935	248,353
June, 1954	2,662,375,708	6,597	9,617	16,214	164,202
July, 1954	2,678,234,354	7,956	10,912	18,868	141,946
August, 1954	2,696,125,660	7,568	9,742	17,310	155,756
September, 1954	2,614,432,913	6,740	8,882	15,622	167,355
October, 1954	2,852,825,785	5,182	6,985	12,167	234,472



R. E. Baker

Maine Central

The Maine Central has terminated arrangements between the Maine Central and the Boston & Maine which have been in effect since 1933 for the employment of joint operating and mechanical department officers and personnel. As a result, the following change became effective February 1 on the Maine Central:

ROY E. BAKER, assistant general manager-mechanical at Boston, has been appointed general manager-mechanical, Maine Central, with jurisdiction over mechanical forces, including Waterville shops, enginehouse, and car and locomotive repairs.

Born: Meyersdale, Pa., February 20, 1901. Education: Pennsylvania State College (B.S. and E.E. 1923). Career: Began as an apprentice engineer, Union Switch & Signal Co., in July 1923. Entered service of B&M in 1925 as air-brake instructor and supervisor of automatic train control. Subsequently became general air-brake inspector; supervisor of air brakes, air conditioning and power plants, and assistant superintendent, Fitchburg division. Appointed superintendent of car maintenance of the B&M, Maine Central and Portland Terminal in 1945, and assistant general manager of same roads in 1948.

New York Central System

Headquarters, New York

J. H. RUSSELL appointed engineer brake equipment, with jurisdiction over system engineering and maintenance of brake and steam-heat equipment.

L. D. HAYS appointed assistant engineer brake equipment.

A. J. SERENO appointed assistant engineer brake equipment.

Norfolk & Western

Roanoke, Va.

H. L. SCOTT, JR., H. M. SINK, L. M. NEWTON, and E. Y. MCGANN appointed mechanical inspectors in the motive-power department.

Southern

BAXTER B. SOWERS, general foreman at Asheville, N.C., appointed general foreman diesels at Sevier shop, Knoxville, Tenn.

PAUL T. HOSKINS, JR., general foreman at Appalachia, Va., appointed general foreman at Chattanooga, Tenn.

DANIEL CASS appointed road foreman of engines at Danville, Ky.

WILLIAM T. ELEAZER appointed assistant foreman electricians at Atlanta, Ga.

MILTON S. RUBLE appointed foreman enginehouse, night, at Danville, Va.

Hayne Shop, Spartanburg, S.C.

JAMES F. HOLBROOK appointed foreman car repairs.

BENJAMIN B. JONES, JR., appointed assistant foreman freight-car repairs.

JAMES C. POPE appointed assistant foreman car shop.

Southern Pacific

FRANK E. MOLLOY, assistant superintendent of motive power in Sacramento, Cal., appointed superintendent of motive power and equipment.

WILLIAM O. BROWN, master mechanic, Portland division, appointed assistant superintendent of motive power at Sacramento, Cal.

Texas & New Orleans Lines

FRANK E. RUSSELL, superintendent of motive power of the SP, has been appointed superintendent of motive power and equipment for the T&NO Lines, with headquarters in Houston, Tex.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JANUARY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horse-power	Service	Builder
Baltimore & Ohio	29	900	Yard switching	Electro-Motive
	20	1,750	Road switching (four motors)	Electro-Motive
	2	1,750	Road switching (six motors)	Electro-Motive
	4	2,400	Road passenger	Electro-Motive
	11	1,000	Yard switching	American Locomotive
	9	1,600	Road switching (four motors)	Baldwin-Lima-Hamilton
	3	1,600	Road switching (four motors)	Fairbanks, Morse
Virginian	10	1,600	Road switching	Fairbanks, Morse
Illinois Central	20	1,750	Road switching	Electro-Motive
Southern Pacific	101	1,750	Freight	Electro-Motive
	1	1,750	Passenger	Electro-Motive
	2	2,400	Passenger	Electro-Motive
	2	900	Switching	Electro-Motive
	1	650	Freight	General Electric
	8	900	Freight	Electro-Motive
	19	900	Switching	American Locomotive
	17	1,000	Switching	American Locomotive
	4	1,600	Freight	American Locomotive

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Great Northern	10 ¹	"Airslide" covered hoppers	General American
Oliver Iron Mining Div., U. S. Steel Corp.	30	100-ton dump	Baldwin-Lima-Hamilton

FREIGHT-CAR INQUIRIES

Road	No. of cars	Type of car
Southern	1,000	50-ton box
Delaware, Lackawanna & Western	50	Flat

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Railway Express Agency	300 ²	Refrigerator	General American

- ¹ Delivery to begin in April and be completed in June.
² Approximate cost, \$2,900,000. Scheduled for early 1955 delivery.
³ For delivery this year. Cost, \$11,707,780.
⁴ Approximate cost, \$121,000. Cars delivered.
⁵ For piggyback service.
⁶ Estimated unit cost, \$20,440.

NOTES:

Denver & Rio Grande Western.—The Rio Grande 1955 budget calls for among other items the acquisition of 18 additional diesel locomotive units and 100 double-deck stock cars. The locomotives, when delivered, will result in "virtually complete" dieselization of the 2,100-mi carrier, although plans call for a few steam locomotives to be maintained on a standby basis for peak traffic periods. In addition to the new stock cars, the road will acquire 10 more "DF" box cars for special lading and 10 caboose. The stock cars will be built at the company's Burnham (Denver) shops. Approximately \$1.3 million has been set aside for the new locomotives, "nearly" \$1 million for the cars, and an additional \$100,000 for improvements to existing equipment.

Baltimore & Ohio.—The B&O has ordered material for construction in its DuBois, Pa., shops of 100 70-ton 53½-ft flat cars. The cars will be completed during March of this year.

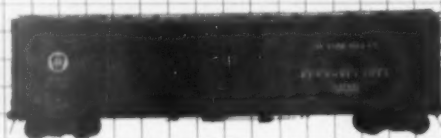
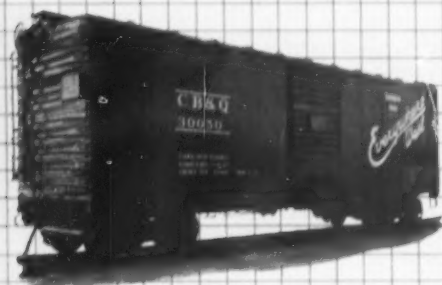
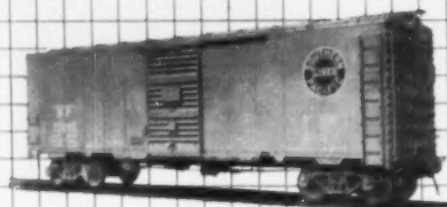
Illinois Central.—The I. C. has announced plans for 1955 capital expenditures totaling approximately \$30,000,000, about \$4,000,000 less than in 1954. The 1955 expenditures include almost \$12,000,000 for the 70 new diesel locomotive units reported above; purchase of 100 70-ton hopper cars; equipping 100 freight cars for specialty loading; "comprehensive" repairs to 12,200 freight cars; purchase of 128 truck miles of new rail; bridge replacements; and yard improvements.

New York, New Haven & Hartford.—Directors of the New Haven have authorized a rebuilding program for 1,000 box cars, built in 1941, to extend the life of the cars, in Class A service, by eight years.

The Transportation Development Corporation, New York, is reported to be working on the engineering and design of a lightweight passenger train for the New Haven, which, if accepted by the railroad, would be built by the Grumman Aircraft Engineering Corporation, Bethpage, N. Y. The TDC, formed earlier this year to promote the "Hastings" lightweight train and prestressed concrete roadbed, states that the train will be capable of speeds up to 175 mph and will carry 256 passengers in its four cars. The tentative design of the new train is said to call for use of three Packard 600-hp diesel engines. These 12-cylinder engines will drive generators which will, in turn, power direct-drive electric motors for propulsion. When supercharged, the engines are reported to be capable of developing 900 hp each. If the design is accepted, it is the opinion of John A. Hastings, vice-president of TDC, that delivery of a complete train could be made late this year.

Western Pacific.—The Western Pacific has ordered from the National Motor Bearing Company, Redwood City, Cal., material to equip 500 freight cars with the new journal bearing lubricating system developed by National Motor Bearing, as described in the January issue, page 60. The WP cars will be the first cars for interchange service to be equipped with the new lubricating device since its application on 10,000 interchange freight cars was approved by the Association of American Railroads last November 30. Installation of the WP order is to begin about February 15.

85,000 box cars have been built better



USS HIGH STRENGTH STEEL

with USS COR-TEN Steel since 1933

These box cars have carried more payload

- have cost less to operate
- have cost less for maintenance
- have proved their ability
to outlast other construction

AT THE PRESENT TIME, more than 33,000 box cars built with USS COR-TEN Steel have been in service for ten years or longer. During that period they have thoroughly demonstrated two things. First, that the economies they make possible outweigh, by far, the slight extra cost of COR-TEN Steel construction. And, second, they have shown that reasonable weight reduction with COR-TEN Steel does not involve any reduction in stamina, life or serviceability.

These facts have not been overlooked by the railroad industry. For it is on the basis of *proved superior performance*, that those railroads which lead in ownership of COR-TEN-built equipment, have through the years added more and more of such cars to their lines.

Take the Southern Pacific for example. This railroad commenced using COR-TEN Steel in 1946. Now has 20,350 box and auto-box cars using COR-TEN in service—enough to make a train 176 miles long. Most of these cars were ordered after the original equipment had proved the merits of COR-TEN Steel construction.

The Union Pacific is another long-time user of COR-TEN Steel box cars. Since 1937 when the first order was placed, fourteen successive orders have brought the total of COR-TEN Steel box cars in U.P. service to 17,080, many of them built in their own shops.

The Milwaukee Road has used COR-TEN Steel in 14,060 box cars built from 1936 to 1949. The C.B.&Q. has used COR-TEN Steel in 10,700 box cars, the Great Northern in 5500, and the Pennsylvania in 2600.

Also enjoying the economic benefits of COR-TEN Steel construction are the Rio Grande, the Santa Fe, the Chicago and North Western, the Lackawanna, and other leading roads which, like all operators of freight equipment, are careful to invest their dollars where they know they will get the biggest return on their money.

We can think of no better reason than this for suggesting that you too investigate the *cost-reducing and revenue-increasing* advantages of USS COR-TEN Steel construction. We will be glad to discuss this matter with you anytime at your convenience.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



See THE UNITED STATES STEEL HOUR
Televised alternate weeks. Consult your
newspaper for time and station.

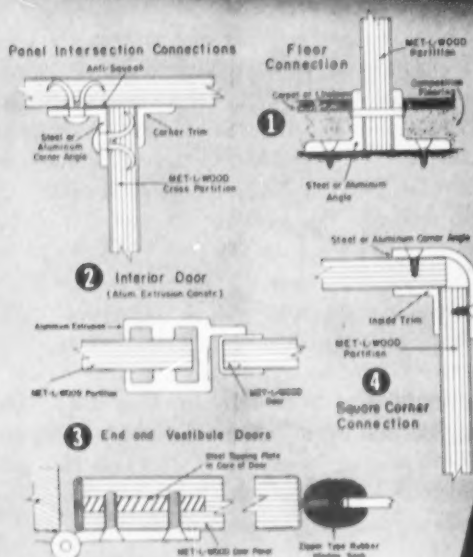
UNITED STATES STEEL

MET-L-WOOD VERSATILITY

FOR MODERN CAR INTERIORS



Met-L-Wood walls provide a smooth, luxurious finish in addition to saving weight and simplifying construction.



MET-L-WOOD passenger car partitions, doors and paneling not only produce beautiful finished surfaces, but can also save up to 73%* in weight and a substantial amount of construction time. Shown at left, and described below are typical Met-L-Wood construction details. Full information on Met-L-Wood versatility in new or rebuilt cars will be furnished promptly on request. Write today.

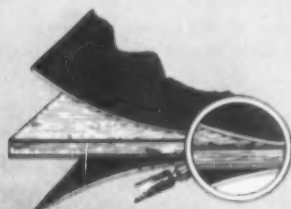
① Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

② Interior doors of Met-L-Wood can be fitted with aluminum extrusion door stops; or the Met-L-Wood partition formed so that the door stop is an integral part of the panel.

③ Steel tapping plate inserts can be put in Met-L-Wood doors at proper places for solidly anchoring hinges and door-opening devices. Note simplicity of using zipper-type window openings.

④ Square or rounded corners are made with Met-L-Wood panels and steel or aluminum corner forms. Corner forms can also be fastened with split rivets or through-rivets, as well as with wood or metal screws.

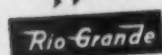
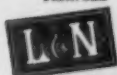
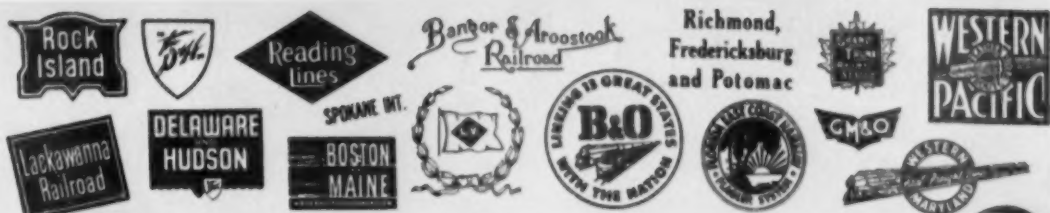
*Met-L-Wood panels $\frac{3}{8}$ " thick, with steel both sides, have a stiffness factor exceeding that of $\frac{1}{4}$ " solid steel plate, while weighing only 27% as much as steel!



MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

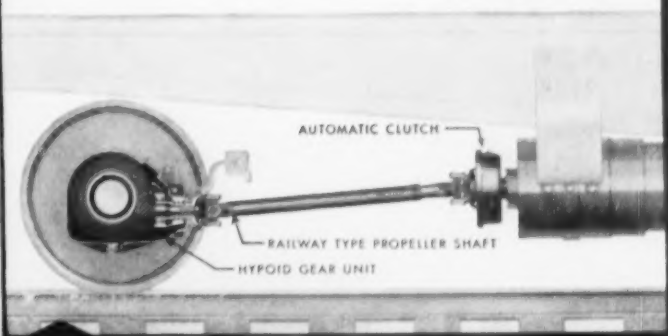
MET-L-WOOD • STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating



MORE THAN 11,000 SPICER Positive GENERATOR DRIVES in operation for over 70 railroads

The Spicer Railway Generator Drive for lighting, air-conditioning, refrigerating and other electrical equipment consists of a very simple application of long-lived hypoid gear and pinion mounted on a standard axle. The drive from the gears is positive and constant through Spicer Universal Joints and Propeller Shaft to the Spicer Automatic Clutch mounted between the generator and the propeller shaft. This automatic clutch completely absorbs all shocks and disconnects the drive line in case of excessive overload, and also completely disconnects the generator at speeds below 8 miles per hour, eliminating shock loads when cars are being shunted.

Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs. Write for further details.

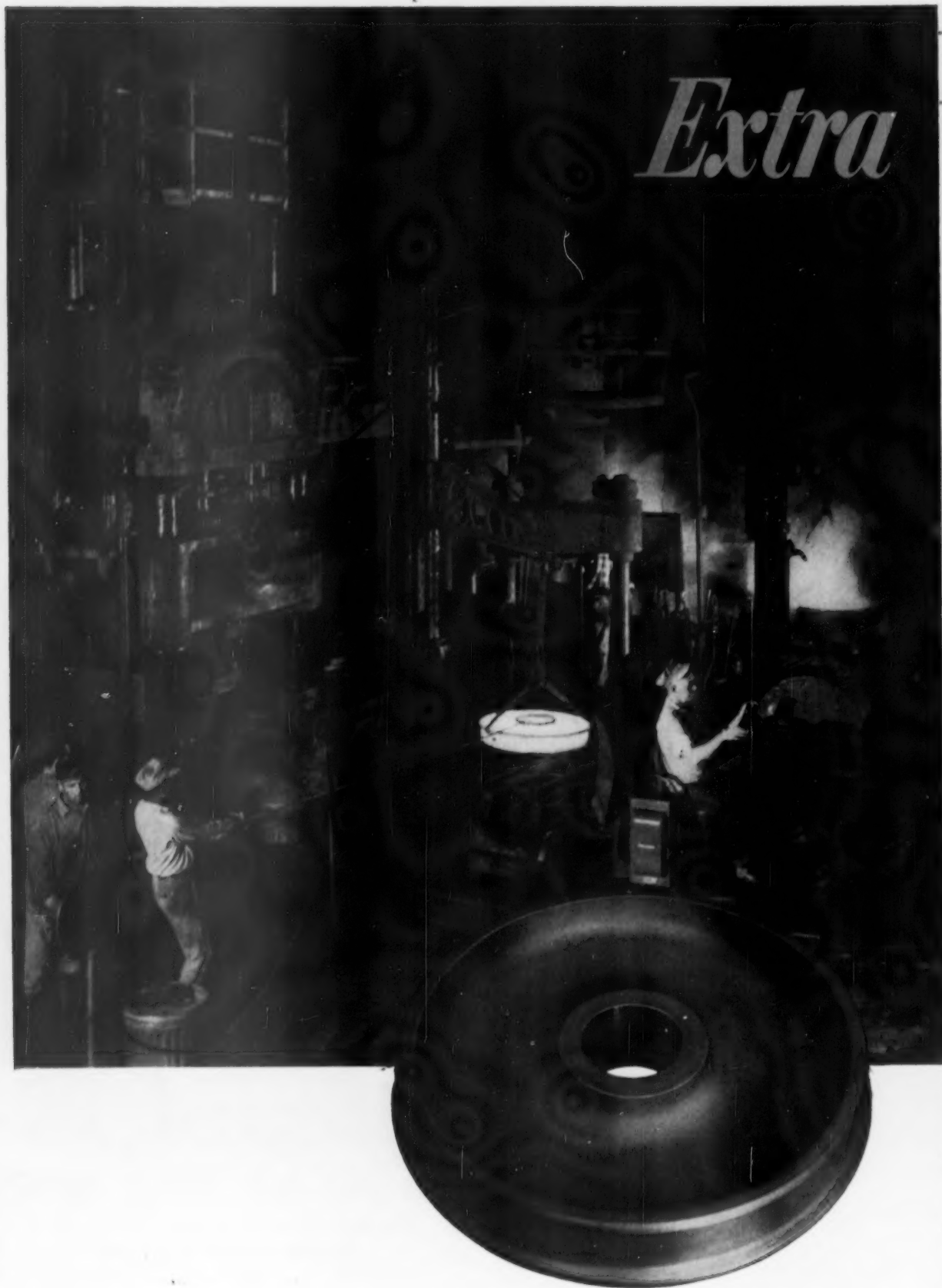


Spicer

Positive GENERATOR DRIVES

Manufactured, Sold and Serviced by
DANA CORPORATION
Toledo 1, Ohio





mileage made here

This is a picture of men making USS Wrought Steel Wheels. Only a few of the forging operations are shown here, but all are indispensable to producing Wrought Steel Wheels of superior strength, excellent soundness, and long wearability.

In the extreme background of the picture, a hot wheel blank is being served up to a press for its second forging.

At the left of the picture, a wheel that has just come off the second forging is being swung from a cart into the mammoth punch press that will knock out the center of the wheel hub.

After the punch operation, the charging machine in the foreground will scoop up the wheel, whirl around and thrust it into one of the furnaces at the extreme right. In the photograph, the charging machine is just removing a glowing wheel from the furnace. Heated to the required temperature, it is ready for the rolling mill where it will be rolled to size, measured, and passed on to the coning press—and so on, and so on.

But what does this one-at-a-time wheel making do for you? What advantages will you realize from USS Wrought Steel Wheels? Well . . .

THEY LAST LONGER . . . USS One-Wear Wrought Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.

THEY COST LESS . . . Their far greater life in any given service will reflect a *substantially lower annual cost* than that of the ordinary wheel, even though, initially, the One-Wear Wrought Steel Wheel costs a little more than the ordinary type wheel.

REQUIRE LESS MAINTENANCE . . . Rolling on One-Wear Wrought Steel Wheels, a car spends more time *in service* and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.

SAVE UNSPRUNG WEIGHT . . . Because they are lighter than ordinary wheels, eight Wrought Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which can be directly converted into payload capacity—or result in savings due to the decreased load. Furthermore, reduced unsprung weight means less pounding on the track system.

Two strategically located complete wheel shops are ready to fill your orders for Wrought Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania shop, serving the East and Southeast, and the Gary, Indiana shop, supplying the Western and Southern Lines.

USS WROUGHT STEEL WHEELS

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.



COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL



**Cut Car Weight
Yet Extend Car Life
By Using a Nickel Alloy Steel**

Built to save money. This car combines stamina and corrosion-resistance, yet saves weight. It utilizes a high strength low alloy steel containing nickel, sold under the trade name, "Yoloy," and produced by Youngstown Sheet and Tube Company, Youngstown, Ohio.

5 Times as Corrosion-Resistant as Carbon Steels

There are two reasons why you can cut dead-weight when you use high strength, low alloy steels containing nickel . . .

First, because thin light sections of these steels provide the same strength and ruggedness as thicker, heavier sections of plain carbon steel.

Second, weight saving is practical with these steels because long tests in actual service have shown their unusually good corrosion resistance: five times that of carbon steels and two and one half times that of copper-bearing steels. A high degree of original strength is thus retained during years of use by steels containing nickel.

In addition, these steels withstand batter-

ing, abrasion and shocks. They answer the railroad man's call for minimum maintenance, and maximum use per dollar invested.

They'll give you a good return on your money by adding years of life to relatively light-weight cars. And less car-weight increases your revenue per ton mile.

Moderate in cost, high strength, low alloy steels containing nickel along with other alloying elements, are produced under a variety of trade names by leading steel companies.

Learn more about these steels, and how they can help you . . . send for a copy of "High-Strength, Low-Alloy Steels." It's yours for the asking.



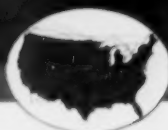
THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK 5, N. Y.

POS

cushion underframe

designed
to meet the
\$111,000,000
annual lading damage
problem

BUILT TO LAST

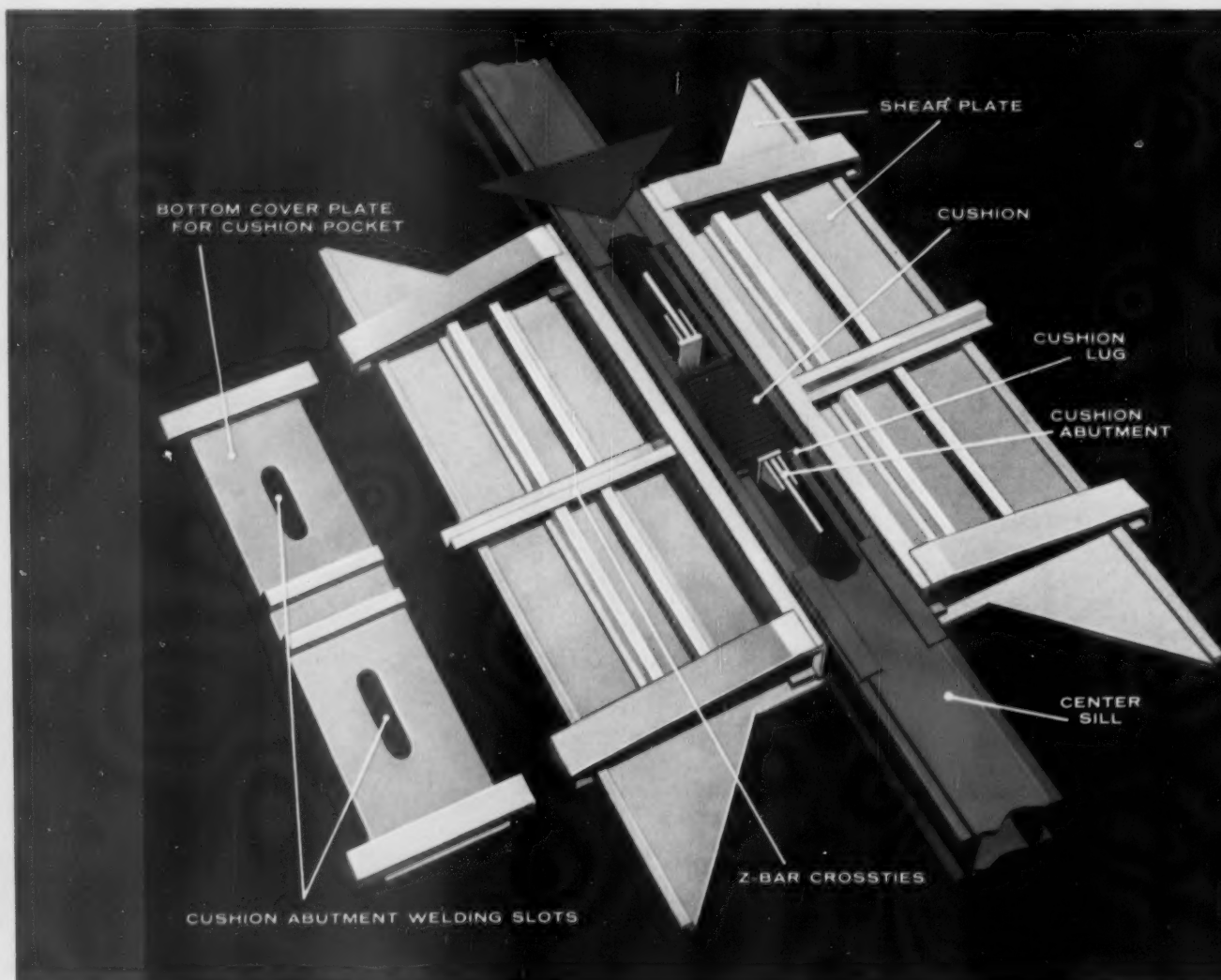


BEST ON THE

GREAT AMERICAN RAILWAY
System

BY FULLMAN-STANDARD

the P-S cushion underframe



The annual lading damage bill for Class I railroads alone is about 111,000,000 dollars. How much of this waste did your road pay? Every dollar paid settling lading damage claims comes out of profit . . . just as every dollar saved through prevention of loss can be added to profit totals. The benefits of loss prevention run to "important money" figures.

Unfortunately, rough car handling during train makeup and in service is inevitable with present day emphasis on speed. Lading damage prevention is dependent largely on mechanical devices.

Pullman-Standard's new Cushion Underframe device promises to greatly reduce staggering lading damage costs from rough car handling.

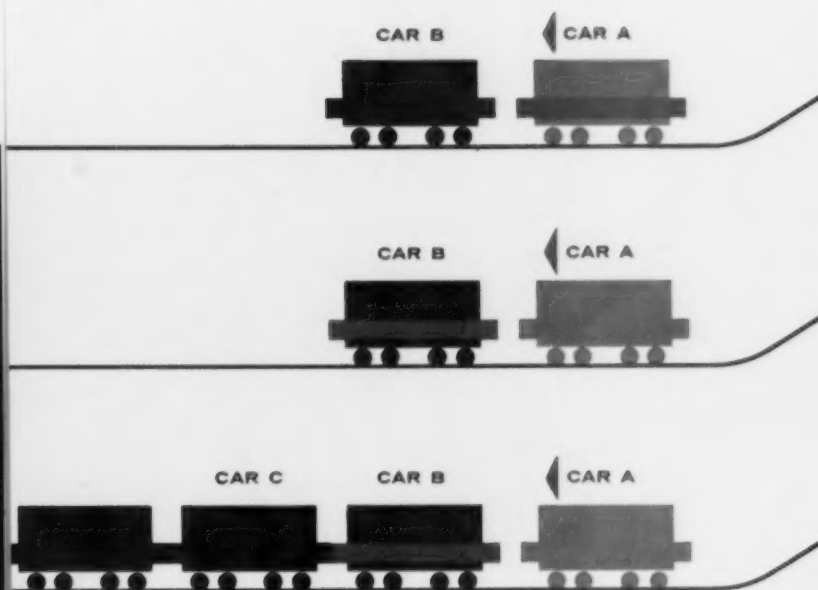
P-S engineers and designers approached the lading damage problem in the light of continuing demands for greater hump and train service speeds, with proportionately rougher car handling. It was obvious to them that a high energy absorption device was needed to offset continually greater coupler impact. Draft gears at each end of the car were found useful,

but limited. Protection devices applied to lading also helped, but had restrictions. Springs were ruled out as they went solid when their limited capacities were reached under heavy impact. The answer seemed to lie in the area between the draft gear and the lading and car body.

They found the solution in a rubber cushion pocketed in the underframe. Housed in a sliding sill that passes freely through bolsters and crossbearers, the rubber cushion is compressed by impact between lugs within the sill and abutments attached through a shear plate to the car body. Thus the P-S Cushion Underframe uses the closing of two standard draft gears plus the action of the rubber cushion to effect high absorption of energy by lengthening the travel during which impact is dissipated.

It can be seen that the P-S Cushion Underframe is based on the theory Long Travel, Low Force . . . like a boxer rolling with the punch. And the P-S Cushion Underframe is proving itself in our laboratory and in service on the Great American Railway System, at impact speeds usually considered "collision."

graphic proof of cushion underframe shock absorption ability



1 When a P-S Cushion Underframe car is the striking car, as is Car A, opposite, and the struck Car B is a conventional car, a double protective action takes place. On impact, the cushion underframe greatly diminishes the effect of the impact on Car A. In addition, the conventional Car B benefits, too, since the shock energies absorbed by the cushion underframe reduce the effect of the impact on Car B. This means double protection for both cars and their lading.

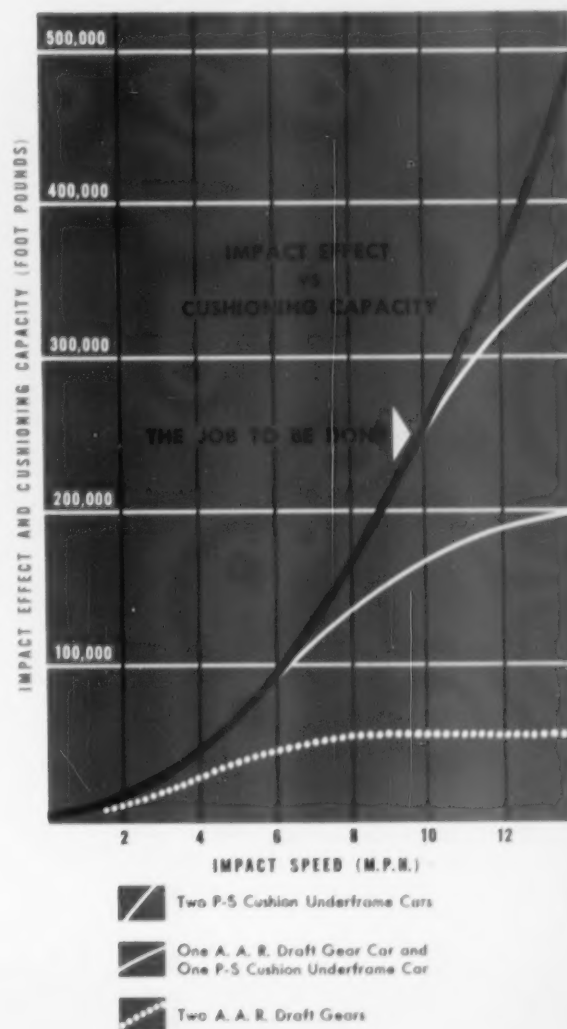
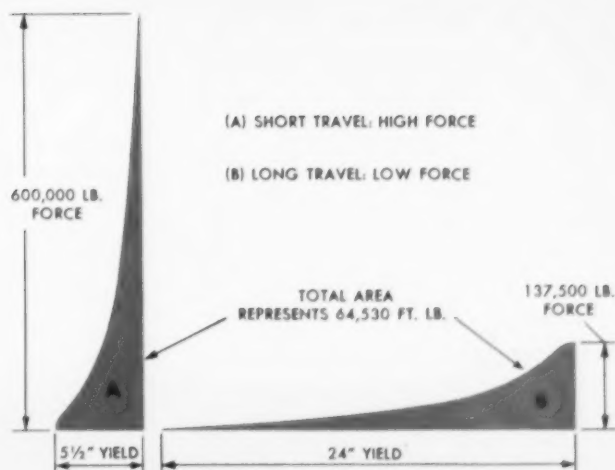
2 With Car A, the conventional car, striking cushion underframe equipped Car B, double protective action again takes place. Not only does the action of the cushion underframe fan out dangerous coupler impacts in Car B but in so doing lessens the effect of the impact on Car A.

3 And the P-S Cushion Underframe performs equally well when the equipped car is the struck car at the head of a cut of cars. When conventional Car A is humped into cushion underframe Car B, the action of the sliding sill guards Car B from permanent deformation, fracture and damage to lading. This situation involves the closing of four standard draft gears, (one in Car A, two in Car B, one in Car C) plus compressing the rubber cushion in the P-S Cushion Underframe.

In all three of these instances the Pullman-Standard theory of Long Travel, Low Force extends the travel of the impact and reduces the shock the car body and lading must absorb.

The chart on the right demonstrates why the Pullman-Standard Cushion Underframe is the most effective car and lading protection device in existence. The "Job To Be Done" trace projects the climb of forces to be absorbed as impact speed increases. Note that less efficient protective devices reach their capacities at low speeds, and contribute little in the high-speed, heavy impact areas. The highest levels of protection are afforded by cars equipped with the P-S Cushion Underframe. As demonstrated by the chart, highest protection levels are obtained by two cushion underframe equipped cars. Effectiveness is 100% of the Job To Be Done, until unusually severe speeds and impacts are reached. Even then, reduction in shock absorption is gradual.

The Pullman-Standard theory of Long Travel, Low Force is visually presented through an assumed 24-inch travel of a cushioning medium, by charts A and B below. With two standard draft gears providing only 5½ inches of yield, 64,530 ft.-lbs. represent an intense and dangerous concentration peak of 600,000 pounds of force to be absorbed by car and lading. The travel is short and the force high. However, with the same number of foot pounds, 64,530, gradually applied through a 24-inch yield the force to be dealt with is only 137,500 pounds. This much smaller force can readily be handled by car and lading with no permanent deformation or fracture. The validity of Long Travel, Low Force is obvious.





ACTION C:
CUSHION IS COMPRESSED BETWEEN
LUGS AND ABUTMENT

neutral 1

neutral 2

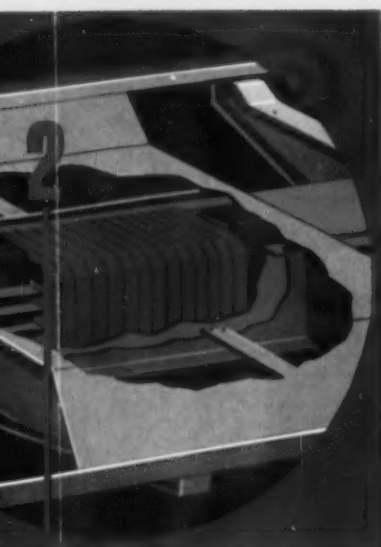
neutral 3

Coupler, cushion underframe sliding sill and conventional draft gear in neutral position, with neither buff nor pull forces being applied.

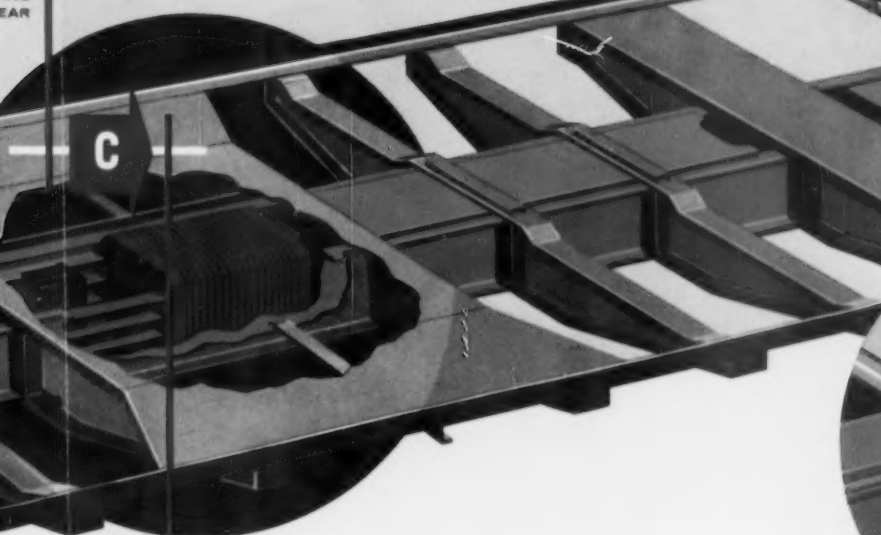
Cutaway of rubber cushion in its pocket, sliding center sill and lugs, abutment and shear plate. All elements in neutral, actionless position.

Opposite end coupler, cushion underframe sliding sill and conventional draft gear in neutral position. No impact or pull is taking place.

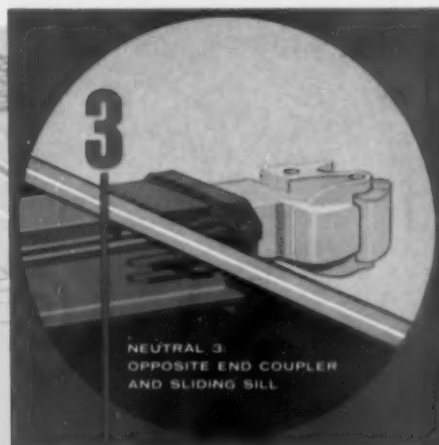
With impact coming from the striking car, the first movement of the struck car is the coupler being driven in, which causes impact absorption to be handled by the cushion underframe. Under heavy impact, the bulk of dangerous shock is handled by the cushion underframe's sliding center sill to press against the bolsters and the cross members causes, in action, the center sill to press against



L 2:
ING
EAR



ACTION C:
RESSED BETWEEN
AND ABUTMENTS



NEUTRAL 3:
OPPOSITE END COUPLER
AND SLIDING SILL

d

ACTION D:
SLIDING SILL AND
COUPLER MOVE



ACTION E:
SLIDING SILL RETURNS
TO NEUTRAL

coming from the left, contact
car is first made on the coupler
car. **action a** shows the
driven in, with closing action
orption taking place in the
draft gear under mild, low speed
heavy impact the draft gear
loaded and goes solid, leaving
dangerous shock energy to be
cushion underframe. **action**
impact forcing the P-S Cush-
e's sliding center sill through
the crossbearers. This move-
action c, the lugs on the
ess against the rubber cushion

in the heart of the cushion underframe. As
the cushion is compressed, it is squeezed
against the abutment which is welded to the
shear plate. The shear plate in turn is fastened
to the car body. When sufficient compression
of the rubber cushion is reached, the inertia
of the car body is overcome. No over-solid,
metal-to-metal point can be reached. The car
then moves in the same direction as the slid-
ing sill. This cushioning lengthens the travel
of the impact, allowing energies caused by the
coupler impact to fan out and run off gradu-
ally through shear plate, car body and lading,
without permanent deformation or fracture.
Coupler forces are not transmitted to the car

structure through the body bolsters, as in con-
ventional gears. **action d** at the opposite car
end demonstrates how the sliding sill moves
freely through the underframe during impact.
action e completes the action cycle and
shows cushion underframe elements return-
ing to neutral position, ready to absorb and
dissipate the coupler shock of the next im-
pact. Cushion underframe action is equally
effective under either buff or pull, such as
when train slack is being run out, and during
road service and switching operations. A
Pullman Standard representative will be
pleased to detail this action cycle for you at
your convenience.

Railroad-Shipper-Consignee experience with the P-S Cushion Underframe

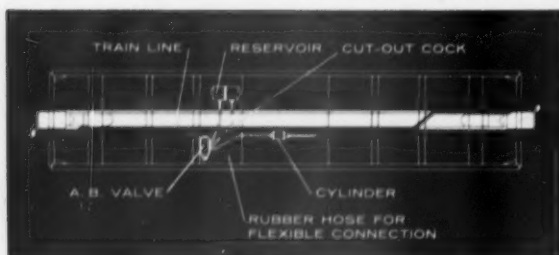
Actual lading damage prevention is rapidly confirming Pullman-Standard expectations for the cushion underframe. Records are being kept by Pullman-Standard and the roads using the P-S Cushion Underframe, and overwhelming proof of in-service performance is being accumulated.

These railroads report their shippers and consignees are enthusiastic about how the cushion underframe is doing the job for which it was designed. And Pullman-Standard representatives have been closely observing the performance of

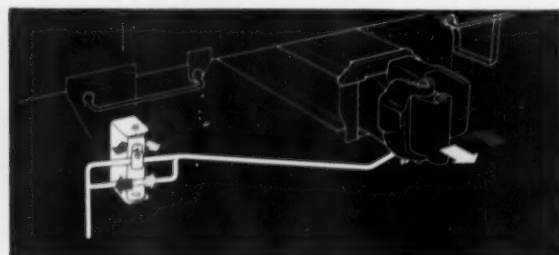
the cushion underframe over a period of more than two years. They know that such products as bottle goods, clay products, appliances, pharmaceuticals, canned goods, and even glass plate are representative of the hundreds of items the cushion underframe protects against breakage and damage.

Let a qualified Pullman-Standard representative detail cushion underframe performance for you. His experience with modern lading protection devices can save you money.

Cushion Underframe Accessory Features



Air brake arrangement—The air brake train line is carried on the sliding sill of the P-S Cushion Underframe. A.B. valve, reservoir and cylinder are secured to the car underframe and connected to the train line by a flexible rubber hose.



Uncoupling device arrangement—Special flexibility built into the uncoupling device is another feature of the P-S Cushion Underframe. This arrangement allows the sliding sill to travel in or out with no stress on the uncoupling mechanism.

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GREAT AMERICAN RAILWAY SYSTEM



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Elastic Stop nuts were specified in 1949 to provide safety and low-cost fastening on the DL&W's famous Phoebe Snow.

Five years of high-speed passenger service confirms low maintenance cost of Elastic Stop[®] nuts

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inspection and retightening. Easily removed without damage to bolt threads they can be re-used through many on-off cycles without loss of effectiveness.

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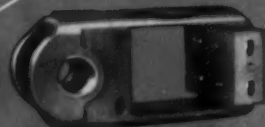
TYPE "E" RIGID SHANK COUPLER & YOK



TYPE "B" TIGHTLOCK COUPLER AND ATTACHMENTS



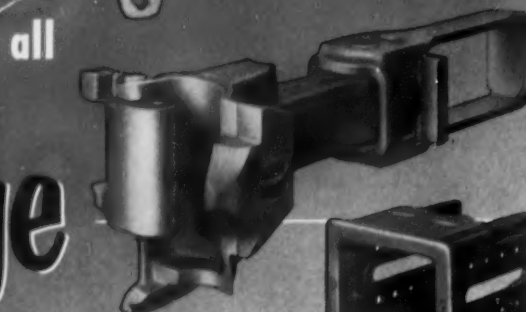
TYPE "E" SWIVEL SHANK COUPLER & YOK



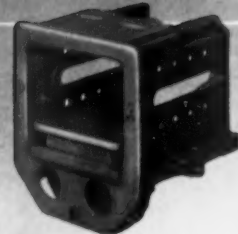
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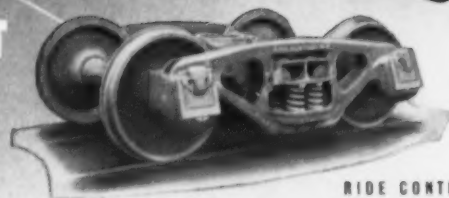
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TYPE "F" INTERLOCK COUPLER AND ATTACHMENTS



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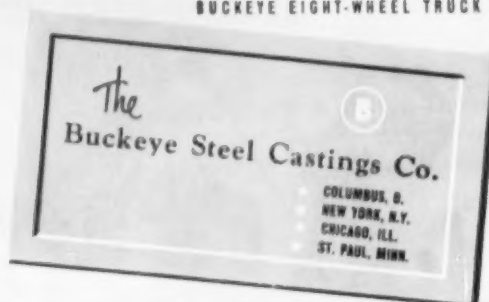


BUCKEYE SIX-WHEEL TRUCK



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Rail Burns

Increased damage to rail caused by driver burns is one of the prices the railroads are paying for the privilege of having diesel-electric locomotives. Steam locomotive drivers slip too, but they do it all at once in a way which makes the engineman acutely aware of the slipping, and since the steam locomotive drivers are relatively large, rail burns caused by slipping are less damaging than with diesels. In the case of a diesel, a single wheel may slip at a speed developed by the characteristics of a series motor and there may be slipping of all wheels of a rear unit, for example, in which case the engineman receives no cab indication, and the slipping wheels are too far away for him to hear.

A typical situation is that of a long freight train which has been braked down to less than 15 mph. The engineman must then follow the rules and not release his brakes until the train has stopped. Then, if he has more than 100 cars he must wait eight minutes after releasing the air. If he is blocking the main line, eight minutes is a long time, and he is enormously tempted to reach for the throttle before the time is up, with the thought, "Maybe she'll go now." The result is almost inevitable with probable rail burns.

The obvious answer for this particular case is closer

adherence to rules, but human nature impelled by a desire to do a good job is hard to change and there are many other reasons for slipping wheels.

There are wheel-slip-preventing devices and automatic sanders for locomotives which are highly effective. They will definitely check rail burn and will definitely increase the capacity of a locomotive, because a unit so equipped will never be long "off its feet."

Of course, the answer to complete locomotive utilization would be always to have the equivalent of a dry rail. The experiments described in the October 1954 issue of *Railway Locomotives and Cars* suggest that this might be accomplished by means of detergents, and studies are under way to determine if this is practicable. One of the first criticisms of such procedure has been "We couldn't afford to keep all the rail on our lines washed." Fortunately, there are only certain sections of line bedeviled by bad rail conditions caused by light moisture and these only at certain seasons. It would appear, therefore, that this method of improving rail conditions, and the use of effective control equipment can contribute importantly to getting the work capacity out of a locomotive that was built into it. By the same means, rail burns should be reduced until they are no longer a problem.

Why Grind Wheels?

Railroads have enough maintenance work to do on cars and locomotives without performing any unnecessary operations. Why, then, do some progressive and economy-conscious roads take diesel and passenger-car wheels, especially for high-speed service, directly from wheel lathes where they have just been turned, to wheel-grinding machines for the final finishing of treads before returning them to service?

No structure can render safe and satisfactory service without a good base, and wheels are certainly the "base" of railroad rolling stock. After surrounding the manufacture of wheel and axle assemblies with the utmost precaution to assure sound materials, efficient design and reliable use, there is still the question of customer satisfaction with results produced. In the case of railway equipment, this means a smooth, comfortable ride, which cannot be expected unless wheel treads are finished accurately and concentric with the journals.

At 90 mph, a 40-in. diesel locomotive wheel makes 757 rpm and a 36-in. passenger car wheel, 840 rpm. Hammer blows from eccentric wheels weighing (with axle) two tons or more are thus delivered not only upward to the trucks and car body and downward to the track, but back and forth between truck pedestals at rates of at least 756 and 840 times a minute. Under such

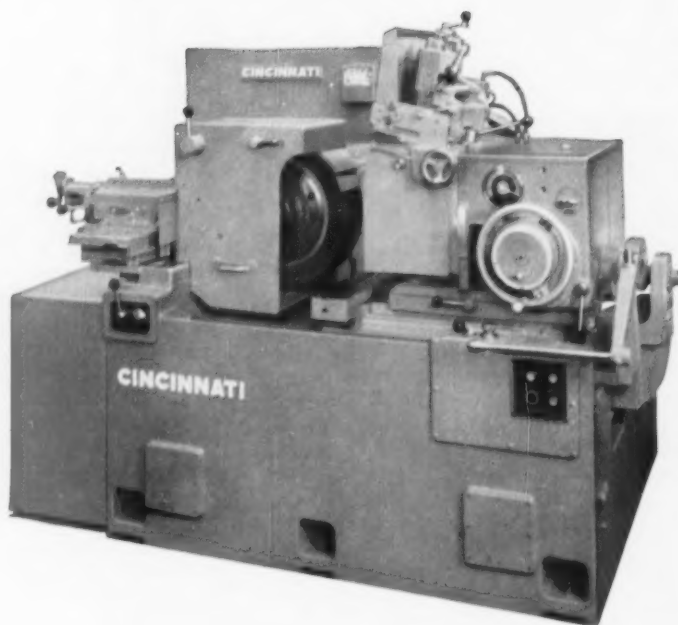
conditions, is it any wonder that truck-spring suspension systems are unable fully to cushion the shocks; truck parts are subject to excessive pounding, and wear and repair costs mount?

New wheels, as well as those just turned, always show some degree of tread roughness and eccentricity when placed in a wheel-grinding machine. Experience shows that the use of the grinder gives an automatic and highly desirable check on wheel-lathe condition, since only a light grinding operation is normally required, taking about 15 min for each pair of steel wheels. When wheels are received with eccentricities up to $\frac{1}{8}$ in. or more, as sometimes happens, the operator has a much longer job and immediately complains to his supervisor about the kind of work that is being turned out on the wheel lathe.

Wheel grinding machines have gone through a remarkable development process in recent years and are now being used to re-form the entire flange, tread and outer taper of steel wheels. The desirability of maintaining wheel treads concentric with journals is hardly open to question. Apparently one of the best ways to do this is with a grinder which does a quick, smooth and accurate job with eccentricity limited to 0.003 in. or even less if desired.

The Hottest News in Centerless Grinding in 30 Years

...the New Cincinnati Filmatic No. 2



New CINCINNATI FILMATIC
No. 2 Centerless Grinding
Machine, Catalog
No. G-644.



Over thirty years of experience in building and tooling thousands of centerless grinding machines has guided the design and construction of the new CINCINNATI FILMATIC No. 2 Centerless.

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And now these additional advantages are included . .

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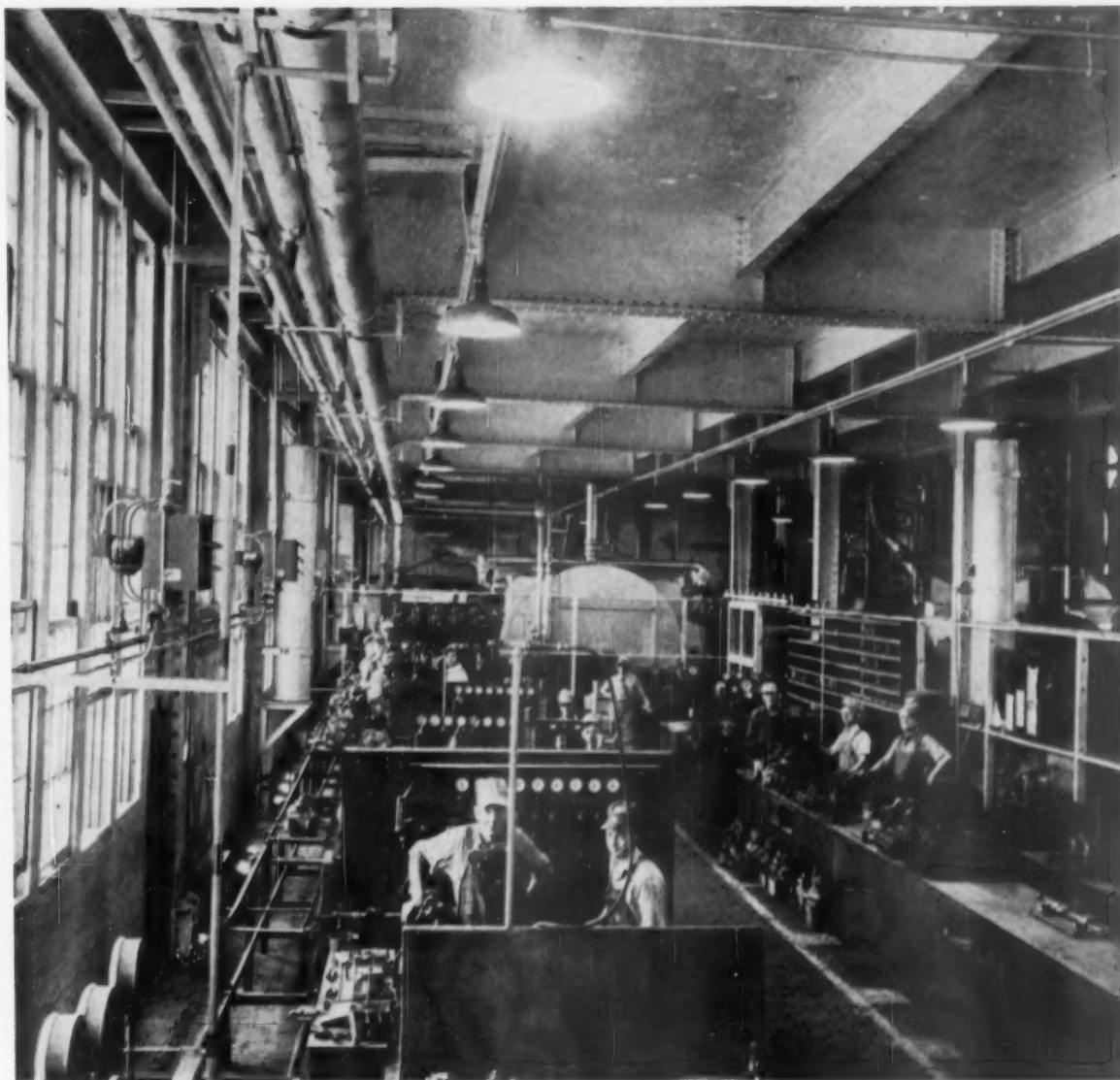
Of course, many more features desired by centerless grinder users are incorporated in the new CINCINNATI FILMATIC No. 2 Centerless Grinder.

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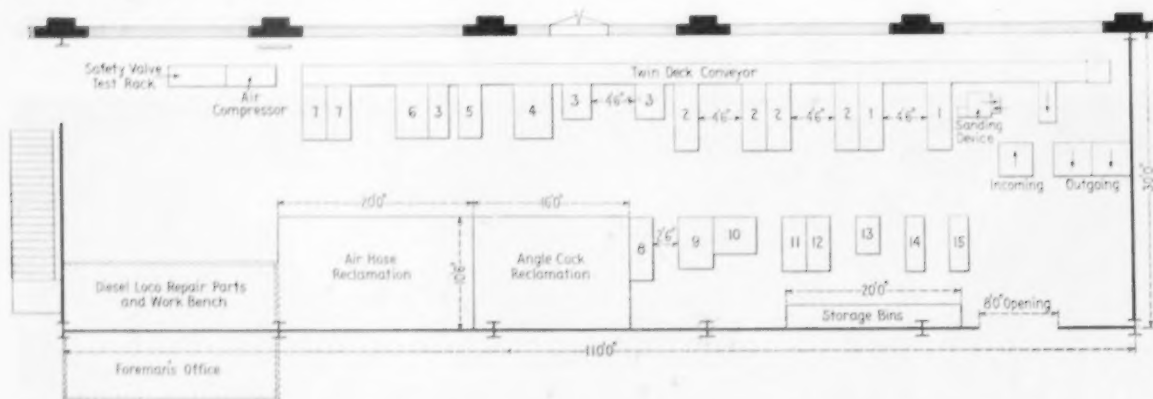
Production-Line Air Room on the KCS

New air brake facility at Pittsburg operating on the assembly line principle has several unique features

THE KANSAS CITY SOUTHERN has set off and enclosed by a wire grill an area 30 ft by 110 ft in the Pittsburg back shop to handle major repairs to all air brake equipments for the system. One side is devoted almost en-

tirely to a mechanized assembly line for overhauling AB valves, the other to repair work on passenger and locomotive brake equipment and to hoses, couplings, angle cocks, etc.

KCS Production-Line Air Room . . .



1—Disassembly bench; 2—AB valve bench; 3—AB test rack; 4—AB test rack with electric test panel; 5—D-22 and D-24 control valve bench; 6—4C test rack; 7—Locomotive brake valve benches; 8—U-12

control valve bench; 9—3-USB test rack; 10—4-F test rack; 11—Feed valve bench; 12—Triple valve bench; 13—3T test rack; 14—Slack adjuster bench; 15—Decelostat bench

The AB side of the room is served by a two-level dolly track with the top track on a slight down incline as the valve proceeds successively to the cleaning station, the work stations and the test rack. The bottom track inclines downward as it proceeds in the return direction with the overhauled valve to the shipping point.

The valves are delivered in the room to what is the start of the upper track and the end of the lower track. An individual valve is removed from the group and placed into a sanding chamber where rust and scale are removed from the valve housing. Next it is placed on a small carriage and allowed to roll free along the inclined track to the disassembly bench. It is removed from the carriage, the service portion is cleaned, and the housing and parts are placed back on the carriage. The procedure is repeated at the next station, where the emergency portion is disassembled. A hinged bumper at each station along the line permits the carman to raise the bumper at his station to stop a rolling carriage, or with a flick of a finger, pivot the bumper down and out of the path of any oncoming carriages.

Final steps of assembly and testing complete the valve's

trip along the assembly line track. As it rolls down the final length of track the loaded carriage overbalances a weight supporting this hinged section. It drops abruptly, allowing the carriage to roll onto the return track directly below and travel non-stop to an automatic elevator at the end of the track.

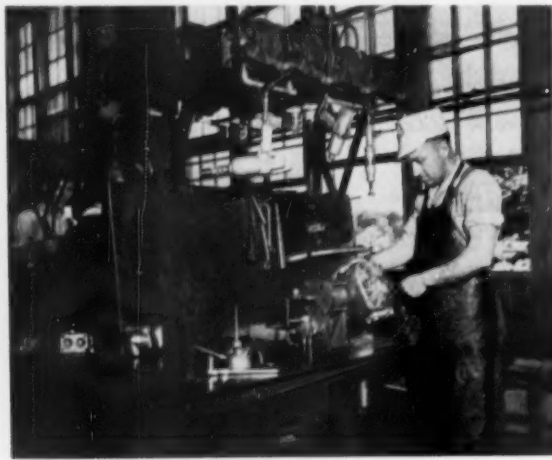
Although assembly line techniques have been employed in the brake valve servicing operation it is not a constantly moving line. The first six stations are divided equally between the service and emergency portions of the valve. If the first airman is occupied when the valve carriage starts to roll down the track he disregards the carriage and permits it to roll to whichever station is ready to receive it.

The last service stand is not part of the AB valve assembly line, but is used for servicing locomotive air brake valves. It is handled by machinists of the diesel shops. This station is placed along the assembly line because that location also happens to be closest to the diesel shop. Complete operation of servicing and testing is performed at this bench.

Two AB valve test racks complete the assembly line



The service benches are located next to the twin-deck conveyor and have deep drawers for bulky equipment



Pneumatic vise with roller bearings around jaw permit rotation of valve housing to get at any part



The carriage hauls the valve between assembly line stations and serves as a tray for dissembled parts.

side of the room. The other half of the room is used for servicing passenger equipment valves and other miscellaneous types and for other test equipment. Angle cocks are repaired and tested and blank air hoses are fitted with nipples and couplings.

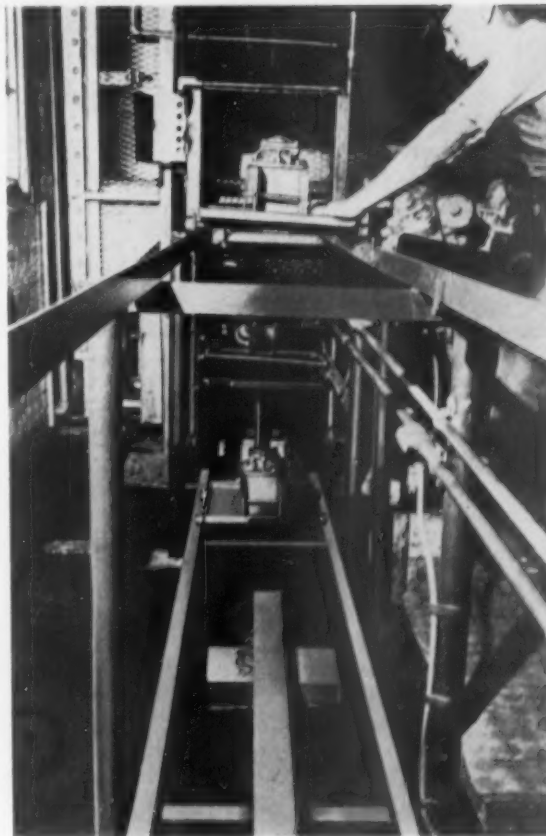
Automatic Stops and Elevator

When the overhauled valve approaches the end of the lower track on its non-stop return trip, a spring-controlled brake slows the momentum sufficiently to permit the carriage to roll onto an air operated elevator at the end of the track. As it passes onto the elevator platform the carriage trips a solenoid which causes the elevator to ascend to the assembly line level near the spot from which it started. The valve is removed from the carriage and placed in readiness with other renovated valves.

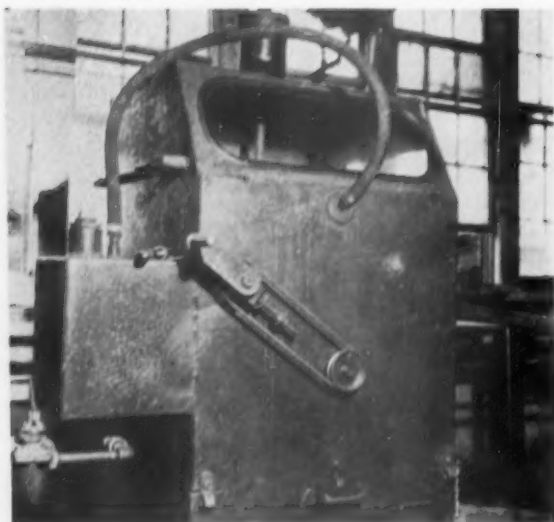
Solenoids at the return end of the assembly line operate holding devices to prevent collision of carriages or any fouling of the elevator mechanism. A solenoid-activated device also releases the air to permit the elevator to descend to its normal position after the renovated valve and its carriage are removed from the elevator.

The elevator is controlled by one magnetic valve and two switches. As a loaded carriage rolls onto the elevator it trips a solenoid, which activates the magnetic valve controlling air pressure in the lift cylinder. Air pressure forces the elevator upward to the top level where, in rolling off, another solenoid is tripped, the magnetic valve is de-energized, thus shutting off the air. The weight of the elevator platform is sufficient to expel the air and permit the elevator to descend.

While the elevator is in its lifting and descending cycle, a holding device prevents an oncoming carriage from running off the end of the track into the elevator shaft.



Beginning and end of twin-deck conveyor, with a completed valve waiting to board elevator, shown midway in ascent



The air brake valve housings get a thorough cleaning in this completely enclosed blasting chamber



With the door open, operator shows how he uses table crank to revolve housing and clean all surfaces with nozzle



The revolving table, and the wire mesh through which the spent shot falls for removal, cleaning and re-use

Attached to the elevator platform is a small, flat metal finger projecting horizontally in the direction of the oncoming carriages. This finger, when the elevator is not in use, depresses a spring-loaded safety post, located on the floor directly beneath the finger. When the elevator rises, the finger rises with it, thus releasing the tension of the safety post and permitting it to rise likewise. In its extended position, the post prevents any oncoming carriage from running off the track.

If more than one carriage is permitted on the return track at once, they will pile up at the safety post and have to be pushed manually onto the platform. There are no other retarders or holding devices on the return track. Assembly line progress is so arranged that no more than two valves ever occupy the return rails at the same time.

The valve carriage is a homemade device which serves the twofold purpose of conveying the valve from station to station and of providing a tray for the valve parts. On the rectangular bed have been welded metal forms into which the valve housing fits snugly. The carriage bed is connected to the wheels at only two points—in the middle at the front and rear. This type of suspension gives the carriage lateral stability and lessens the probability of a derailment along the track.

Enclosed Chamber For Cleaning

Sand blasting is done in a completely enclosed chamber. The operator sets the worn valve on a small circular table in the sander and seals the door. An incandescent bulb inside the chamber illuminates the work, which the operator can observe through plexiglass panels located on two sides of the chamber. The nozzle of the sand blasting hose protrudes through a sleeve from the outside where the operator directs the blast against the valve housing. A hand crank located conveniently enables the operator to rotate the housing as the work continues.

Sand, used originally as the propulsive ingredient, has been replaced by spherical shot, about size 10 or 11. This type, in turn, may be replaced by angular shot. Spent shot falls through the wire mesh to the bottom of the chamber, where it is removed, cleaned and re-used.

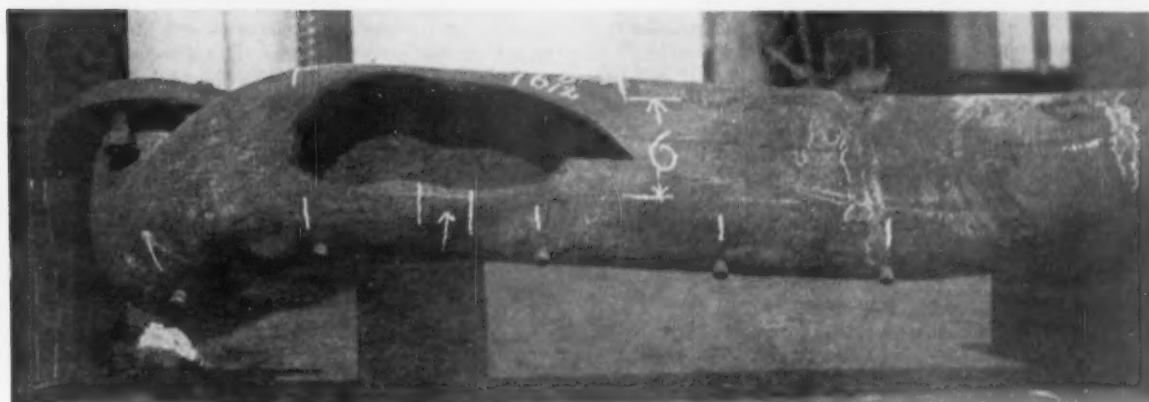
The work benches are 2 ft 6 in. by 6 ft 10 in., constructed entirely of scrap metal and embody many features to facilitate the air brake repairman's work, including elevated steel decking. Chief point of activity is the valve housing vise. When the carman lifts the valve from the carriage he sets it on a small pneumatic stand. Steadying the housing with one hand he twists a double acting valve which raises the valve housing into correct position between the jaws of the air operated vise. A twist of the lever in the opposite direction tightens the vise jaws against the valve housing and at the same time releases air pressure on the stand, thus allowing it to reseat itself in position on the table.

Vise jaws revolve on roller bearings and permit the operator access to all necessary bolts and nuts on the valve housing with his air operated impact wrenches strung overhead. There are one large and one small impact wrench, one miscellaneous head for grinding, burnishing and buffing, and one compressed air hose. All of these are attached to tension controlled reels which snap up and out of the way when not in use. The vise eliminates practically all manual lifting of the housing while it is being serviced.

IN 1954 . . .



A SEIZED traction motor pinion bearing caused the sliding damage on the above driving wheel. The opposite wheel (left) shows the 8-in. flat slid spot on the tread and the false flange which displaced a switch rail causing derailment and injuries to 189 persons.



MAIN STEAM PIPE which failed on a locomotive hauling a freight at 35 m.p.h. The core had apparently shifted during casting as subsequent investigation showed considerable variation in wall thickness.

Bureau Reports on Locomotive Defects

THE ANNUAL REPORT of the ICC Bureau of Locomotive Inspection for the year ended June 30, 1954, shows an "improvement" in the situation with respect to steam locomotives (due almost entirely to the rapidly diminishing numbers—ED.) and a rapidly increasing number of defects with respect to "locomotives other than steam." Every indicator of condition in this category shows that the percentage of those inspected and found defective is not only increasing but the number ordered out of service and the number of defects found is increasing also. The tables accompanying this abstract tell the situation at a glance.

Thirty-two accidents occurred in connection with steam locomotives resulting in 1 death and 39 injuries. This represents a decrease of 27 accidents; a decrease of 11 in

the number of persons killed, and a decrease of 23 in the number of persons injured compared with the preceding year.

During the year 13 per cent of the steam locomotives inspected by the inspectors were found with defects or errors in inspection that should have been corrected before the locomotives were put into use; this is an increase of 0.6 per cent from the results of the preceding year.

One hundred and seventeen locomotives were ordered withheld from service by the inspectors because of the presence of defects that rendered the locomotives immediately unsafe; this is a decrease of 46 locomotives compared with the preceding year.

The single boiler explosion which occurred in the fiscal

year was caused by overheating of the crown sheet due to low water. One person was killed and 7 were injured in this accident. There was a decrease of 3 boiler explosions as compared with the preceding year; a decrease of 9 fatalities and an increase of 5 in number of injuries from this cause as compared with the preceding year.

The locomotive involved in the explosion was engaged in terminal switching service and at the time of the accident was standing in a freight car yard. Examination of the boiler subsequent to the accident disclosed that the water level at time of the explosion as shown by sheet discoloration was approximately 6½ inches below the highest part of the crown sheet. It was also determined that gage cock nipples extended into the drifter thereby obstructing clear view of gage cock discharge.

A piece of the wall of the main steam pipe in the front end of a steam locomotive, approximately 6 x 16½ inches in size, broke out while the locomotive was hauling a freight train at an estimated speed of 35 miles per hour and resulted in serious injuries to 2 employees. The failure occurred in an area where the pipe wall was very thin, a fissure existed and the metal contained old fractures.

The thin wall apparently was caused by a shifted core when the pipe was cast.

Another front-end accident occurred when the petticoat pipe in the smokebox of a steam locomotive became displaced; diverted the flow of exhaust steam and caused heavy back draft while the locomotive was hauling a freight train at an estimated speed of 35 miles per hour and caused serious injury to an employee. The bottom edge of the petticoat pipe had been attached to the top ring of the spark arrester by spot welds instead of bolts as specified by the manufacturer. Cinder cutting had caused detachment of some spot welds and heavy vibration had caused the remaining welds to fail.

Eighteen boiler and appurtenance accidents other than the explosion resulted in injuries to 19 persons. This represents an increase of 4 accidents and an increase of

2 in the number of persons injured in boiler accidents other than explosions as compared with the preceding year.

Four hundred and ninety-eight applications were filed for extension of time for removal of flues, as provided in Rule 10. Investigations disclosed that in 28 of these cases the condition of the locomotives or other circumstances were such that the requested extensions could not properly be granted.

Eleven extensions were granted after defects disclosed by the investigations were required to be repaired. Thirty-three applications were canceled for various reasons. Four hundred and twenty-six applications were granted for the full period requested.

Seventy-three accidents, resulting in 2 deaths and injuries to 263 persons occurred in connection with locomotive units propelled by power other than steam. This represents a decrease of 2 in the number of accidents, an increase of 2 in the number of persons killed and an increase of 175 in the number of persons injured compared with the preceding year.

During the year, 8.9 per cent of the locomotive units inspected by the inspectors were found with defects or errors in inspection that should have been corrected before the units were put into use; this represents an increase of 0.2 per cent compared with the results obtained in the preceding year. One hundred and forty locomotive units were ordered withheld from service by the inspectors because of the presence of defects that rendered the units immediately unsafe; this represents an increase of 22 units compared with the preceding year. Locomotive units found defective were not ordered out of service if such defects did not render them unsafe for the service to which they were put.

Accidents Involving Other Than Steam Locomotive Units

In derailment of two locomotive units and 11 cars of a passenger train caused by a false flange on a slid flat driving wheel resulting from a seized traction motor pinion bearing on a diesel-electric locomotive unit, 184 passengers, 4 mail clerks and 1 dining car employee were injured. Evidence developed during investigation of the accident indicated that the locked pair of wheels had been sliding for a distance of more than 24 miles prior to point where derailment occurred. No lubricant was found in the seized bearing which showed evidence of extreme overheating. The extent of damage to the bearing precluded determination of the cause of its failure. Because of the serious potentiality of accidents caused by sliding wheels it was recommended in a report prepared jointly with the Section of Railroad Safety that action be taken to provide that an indication of any slipping or sliding wheel on any diesel-electric unit in the locomotive of a train will be shown in the control cab.

During the year, 11 persons were injured in falls caused by oil or grease accumulations on walking surfaces of diesel-electric locomotive units. Disability in these accidents amounted to 171 man-days. Oil leaks represented a large proportion of 1,703 defects reported by inspectors of locomotives under item of "cab floors, aprons and deck plates." Action to avoid continuance of this type defect and accidents resulting therefrom is being stressed.

Incidence of cracked and broken wheels under diesel-

ACCIDENTS AND CASUALTIES CAUSED BY FAILURE OF SOME PART OR APPURTENANCE

STEAM LOCOMOTIVE, INCLUDING BOILER OR TENDER

	Year ended June 30—				
	1954	1953	1952	1951	1950
Number of accidents	32	59	122	167	169
Percent increase or decrease from previous year	45.8	51.6	26.9	1.2	25.9
Number of persons killed	1	12	3	14	7
Percent increase or decrease from previous year	91.7	300.0	78.6	100.0	30.0
Number of persons injured	39	62	126	170	184
Percent increase or decrease from previous year	37.1	50.8	25.9	7.6	24.3

¹ Increase.

STEAM LOCOMOTIVE BOILER

	Year ended June 30—						
	1954	1953	1952	1951	1950	1949	1915
Number of accidents	19	18	35	51	59	81	424
Number of persons killed	1	10	2	3	4	9	13
Number of persons injured	26	19	36	59	70	94	467

LOCOMOTIVE UNITS OTHER THAN STEAM

	Year ended June 30—				
	1954	1953	1952	1951	1950
Number of accidents	73	75	74	54	51
Number of persons killed	2	2	1	2	3
Number of persons injured	263	88	77	129	50

REPORTS AND INSPECTIONS

	Year ended June 30—				
	1954	1953	1952	1951	1950
Number of locomotives for which reports were filed	12,135	15,798	20,490	26,595	29,743
Number inspected	19,999	28,899	45,220	62,113	66,809
Number found defective	2,599	3,583	6,234	7,995	6,740
Percentage of inspected found defective	13.0	12.4	13.8	12.9	10.1
Number ordered out of service	117	163	370	508	399
Number of defects found	9,763	12,980	24,738	34,657	28,504

electric locomotive units continues, but no accident was reported from this cause during the past year. The necessity for careful and frequent inspection of diesel unit wheels is well recognized, and apparently the railroads are exercising diligence in the matter of wheel inspections.

One person was killed when his clothing became entangled around a moving and unguarded fan shaft as he attempted to obtain a water sample from an inconveniently located water glass drain cock. Three other persons suffered amputation of a total of 9 fingers and 2 of these also had arms broken when caught in auxiliary generator drive belts that were not properly protected. Because of limited space within bodies and under hoods of diesel-electric locomotive units, complete protection of moving and rotating parts is essential if accidents are to be avoided.

Three crankcase explosions and two fires on diesel engines resulted in injuries to six persons. Electrical fires in engine compartments, about units, short circuits and explosions caused by flash-overs in electrical cabinets caused injuries to nine persons. Because of danger of fires resulting from the liquid fuel and the high pressures and temperatures used in diesel engines and the possibility of accident from electrical short circuits, a high standard of inspection and maintenance is required at all times if accidents are to be avoided.

Specification Cards and Alteration Reports

Under Rule 54 forty-five specification cards and 1,036 alteration reports were filed, checked, and analyzed. These reports are necessary in order to determine whether or not the boilers represented were so constructed or repaired as to render safe and proper service and whether the stresses were within the allowed limits. Corrective measures were taken with respect to numerous discrepancies found.

Under Rules 328 and 329 of the Rules and Instructions for Inspection and Testing of Locomotives Other Than Steam, 1,975 specifications and 811 alteration reports were filed for locomotive units, and 639 specifications and 430 alteration reports were filed for boilers mounted on locomotive units other than steam. These were checked and analyzed and corrective measures taken with respect to discrepancies found.

No formal appeal by any carrier was taken from the decisions of any inspector during the year.

CASUALTIES CLASSIFIED ACCORDING TO OCCUPATION

	Year ended June 30—					
	1954	1953	1952	1951	1950	
	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:						
Engineers	24	14	15	11	15	
Firemen	29	36	31	30	21	
Brakemen	1	1	1	4	3	
Conductors	1	1	1	1	4	
Switchmen	1	1	1	5	1	
Maintenance employees	2	4	6	1	3	
Other employees	1	1	1	13	1	
Nonemployees	188	13	1	63	2	
Total	2263	88	77	2129	350	

	Year ended June 30—					
	1954	1953	1952	1951	1950	
	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:						
Engineers	1	13	4	23	1	64
Firemen	10	4	21	2	45	62
Brakemen	4	3	8	19	1	20
Conductors	2	3	3	6	4	5
Switchmen	1	1	1	1	1	1
Roundhouse and shop employees:						
Boilermakers	1	1	1	1	1	1
Mechanics	2	1	1	1	1	1
Foremen	1	1	1	1	1	1
Inspectors	1	1	1	1	1	1
Watchmen	2	1	1	1	1	1
Boiler washers	1	1	1	1	1	1
Hostlers	1	1	1	1	1	1
Other roundhouse and shop employees	1	1	1	1	1	1
Nonemployees	6	1	1	2	4	6
Total	139	12	62	3126	14	170

PARTIAL LIST OF PARTS FOUND DEFECTIVE, INOPERATIVE OR MISSING

	Year ended June 30—		
	1954	1953	1952
Air compressors	326	210	206
Batteries	82	40	39
Boilers	175	103	69
Brake equipment	2,126	1,696	1,450
Cabs and cab windows	858	679	813
Cab floors, aprons, and deck plates	1,703	1,589	1,694
Controllers, relays, circuit breakers, magnet valves and switch groups	454	424	222
Draft gear	291	218	202
Driving boxes, shoes, and wedges	154	128	98
Fuel system	1,951	1,853	1,751
Internal-combustion engine defects, parts and appurtenances	4,848	4,564	4,768
Jumpers and cable connectors	178	156	191
Motors and generators	813	655	674
Sanders	1,290	1,224	1,202
Steps, footboards, et cetera	622	505	480
Trucks	503	439	390
Warning signal appliances	121	122	117
Wheels	257	212	230
Number of defects	19,640	17,163	16,613

	Year ended June 30—		
	1954	1953	1952

	Year ended June 30—		
	1954	1953	1952
Air compressors	304	351	671
Brake equipment	835	1,038	1,955
Cabs, cab windows, and curtains	298	354	694
Cylinders, saddles, and steam chests	364	455	908
Driving boxes, shoes, wedges, pedestals, and braces	258	345	681
Frames, tall pieces, and braces, locomotive	151	225	368
Gage cocks	120	211	337
Injectors and connections	674	843	1,615
Packing nuts	240	294	552
Packing, piston rod and valve stem	154	229	494
Reversing gear	170	216	429
Rods, main and side, crankpins, and collars	315	459	990
Sanders	277	324	552
Springs, and spring rigging	834	1,322	2,424
Steps	255	321	561
Tanks and tank valves	340	466	980
Throttle and throttle rigging	228	327	608
Trucks, engine and trailing	171	263	427
Trucks, tender	152	219	474
Valve motion	174	195	437
Water glasses, fittings, and shields	282	357	651
Wheels	107	151	340
Number of defects	9,763	12,980	24,738

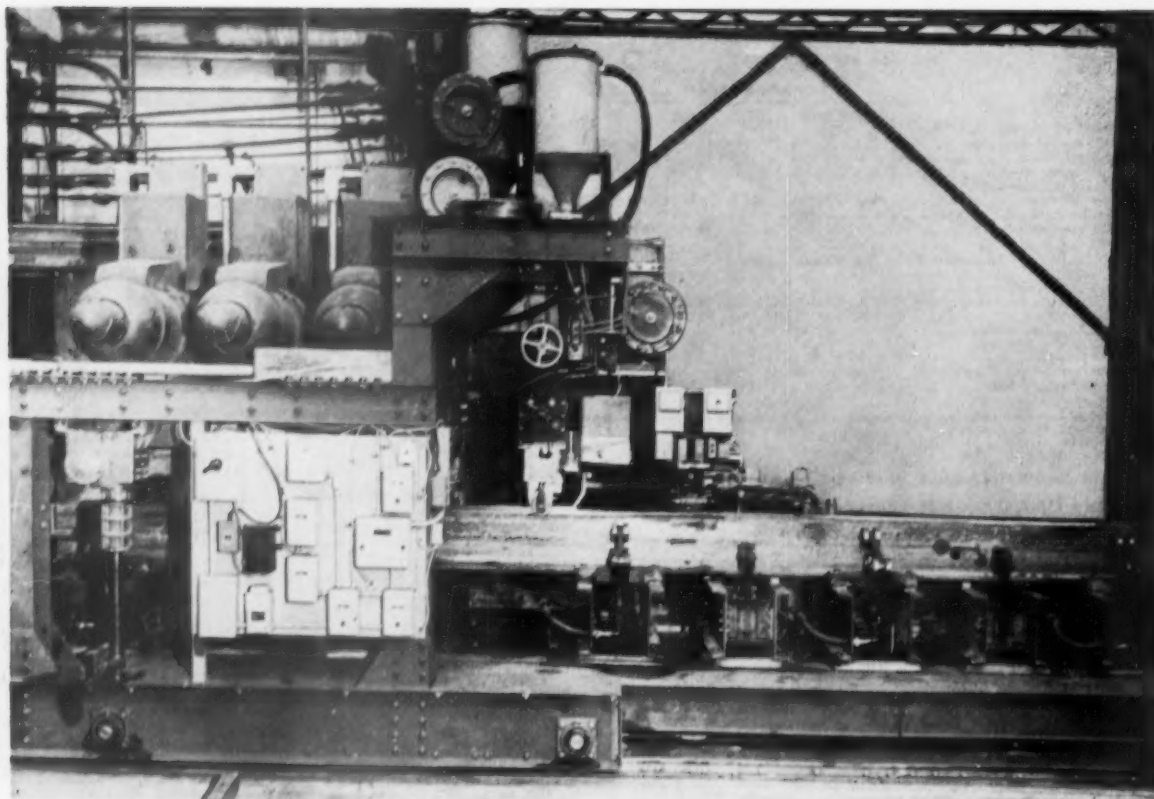


FIG. 1—General view of the welding machine.



FIG. 2—The two Z bars which make the sill are held in position by hydraulic clamps during the welding operation.

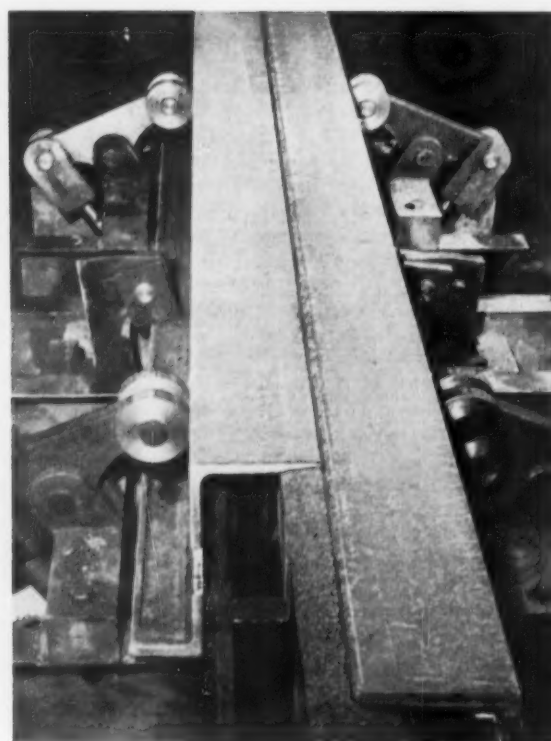


FIG. 3—Welding flux is pressed against the bottom of the weld as shown.

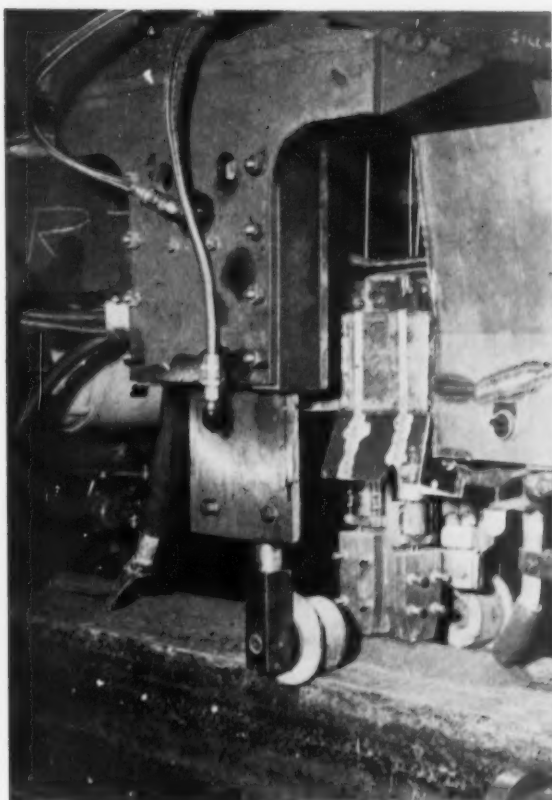


FIG. 4—Flux is laid down on top of the bars ahead of the weld and picked up behind.

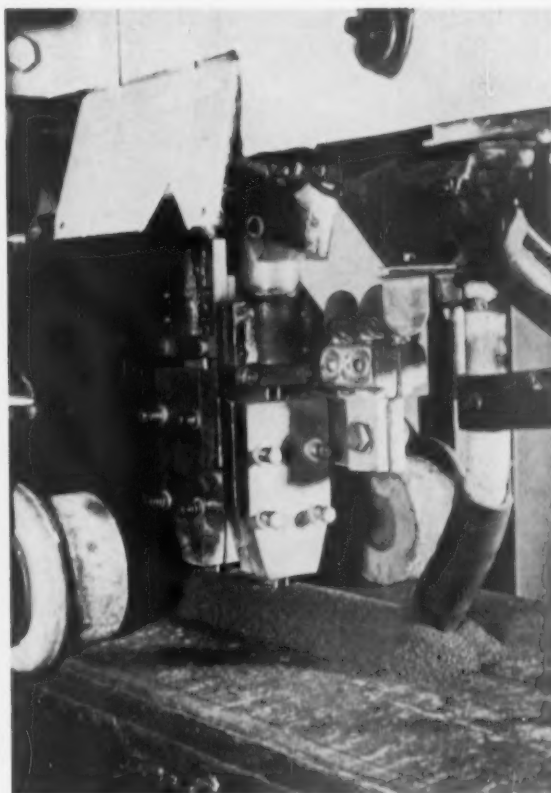


FIG. 5—The two forward electrodes make the initial weld and the third which trails, increases the penetration.

Welded Center Sills for Freight Cars

A. C. F. Industries develops a highly improved automatic welding process which insures a high quality product

CENTER SILLS for freight cars manufactured by A. C. F. Industries are now being fabricated by a new automatic welding process. The sills are made of two Zee bars placed back to back and welded along the edges of the two upper flanges.

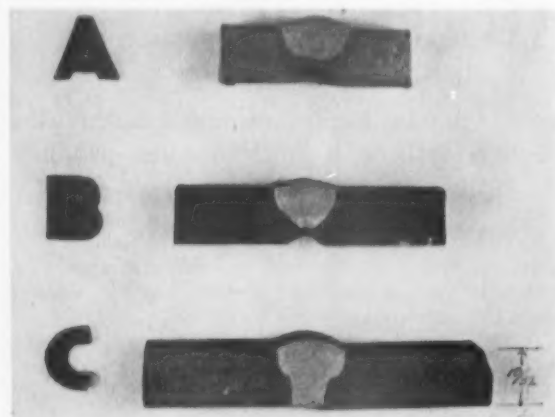
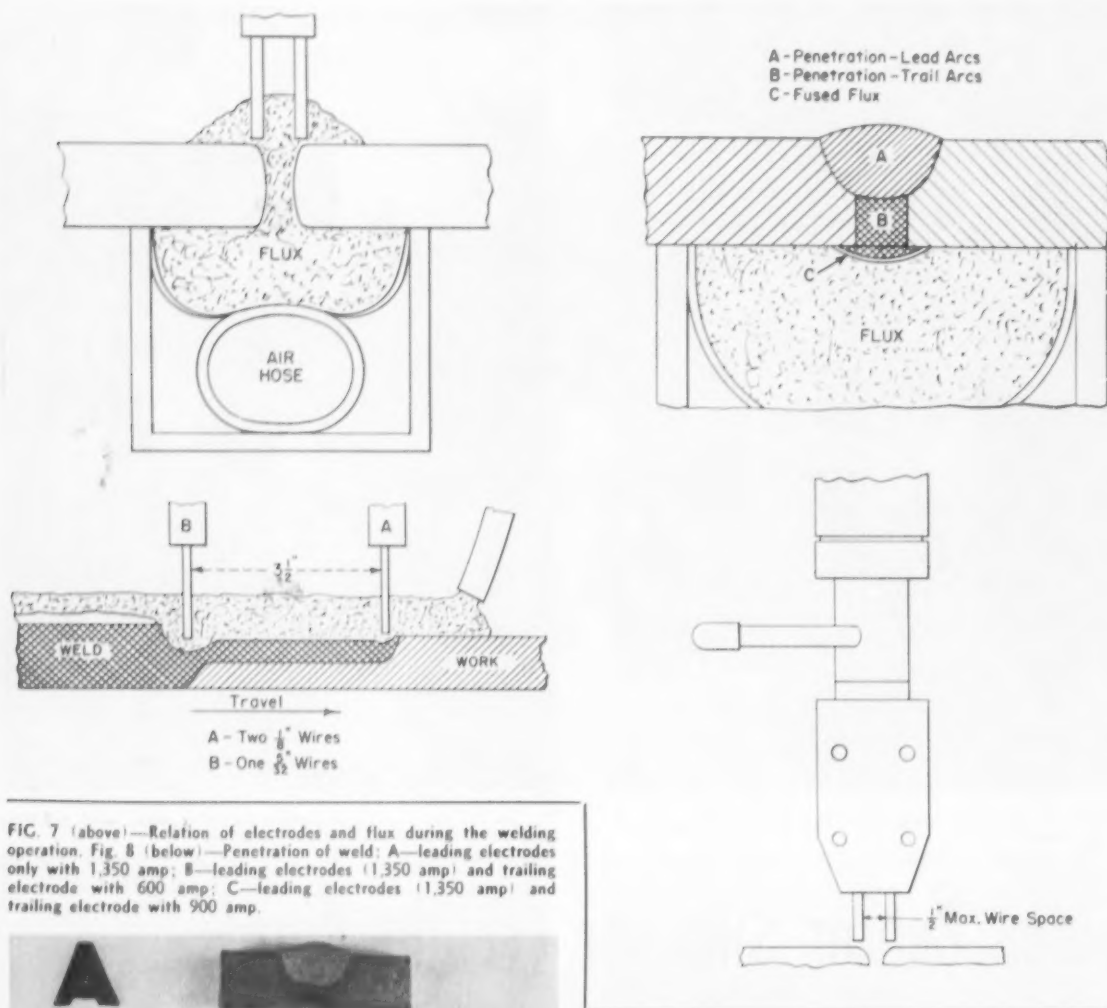
Submerged arc welding is employed, and during the welding process the under side of the weld is backed up with welding flux. The flux is contained in a canvas retainer as shown in the sketch and is held tightly against the weld by a 3-in. hose inflated with air. The hose is placed under the canvas retainer as shown.

The two Zee bars are placed as shown in Fig. 2 and Fig. 3, and are held in place on a jig by a series of hydraulic clamps which maintain an inside measurement of $12\frac{7}{8}$ in. A camber of $1\frac{1}{2}$ in. in 40 ft is built into the jig so that the sill is held at this camber during the welding operation. The jig will take all weights and sizes of Zee bars up to 60 ft in length. The welding is accomplished by means of a traveling gantry which straddles

the Zee bars. The gantry carries three d-c welding sets, a flux recovery unit, three reels of welding wire and two automatic welding heads and secondary power requirements.

As the carriage moves along the weld, flux is deposited ahead of the weld as shown in Fig. 4, and is picked up by a vacuum cleaner behind the weld as shown in the same illustration.

Three welding wires are used as shown in Fig. 5. The first two which make the initial weld are $\frac{1}{8}$ -in. in diameter and the third is $\frac{5}{32}$ in. The first two make a weld having a penetration as shown by A in Fig. 8. The third wire which trails the first two by $3\frac{1}{2}$ in. increases the penetration as shown by B in Fig. 8, over the greater part of the weld. For a distance of two feet on either side of the bolster center, the current on the third wire is increased so that the penetration is increased as shown by C in Fig. 8. Current value used on the first electrodes which are in parallel is 1,350 amp and for maximum



penetration, it is as high as 900 amp on the third wire. Speed of welding is 5 to 6 ft per min.

In Fig. 5, the two leading electrodes are shown side by side. These may be rotated to any desired position and this is done by the operator as the work progresses depending upon the spaces between the two Zee bar flanges. No mechanical preparation of the edges to be welded is required.

The control panel shown in Fig. 6 is mounted on the carriage beside the welding head and constantly shows

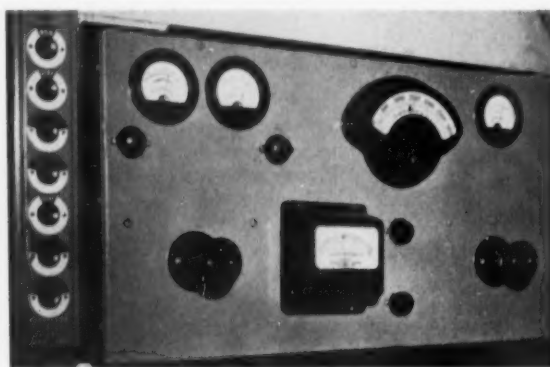


FIG. 6—The control panel mounted on the welding carriage.

current values to the operator and permits him to adjust them as the work progresses. The electrodes are electrically positive to the work.

Average welding speeds are 50 to 80 in. per min. At this rate, the machine deposits about 33 lb of weld metal per hour.



CABOOSE No. 903 was equipped with electric lights and radio.

Cabooses With Lights and Radio

Lackawanna has built 61 new units of own design in own shops—the last word in comfort and efficiency

DURING the past 20 months the Lackawanna has been turning out, at its Keyser Valley, Pa., car shops, a group of 61 new all-steel cabooses. Thirty-two of these have been equipped with electric lights and 27 with two-way radio. These new cabooses are an all-Lackawanna product—both design and production. These new caboose cars are numbered 850 to 910.

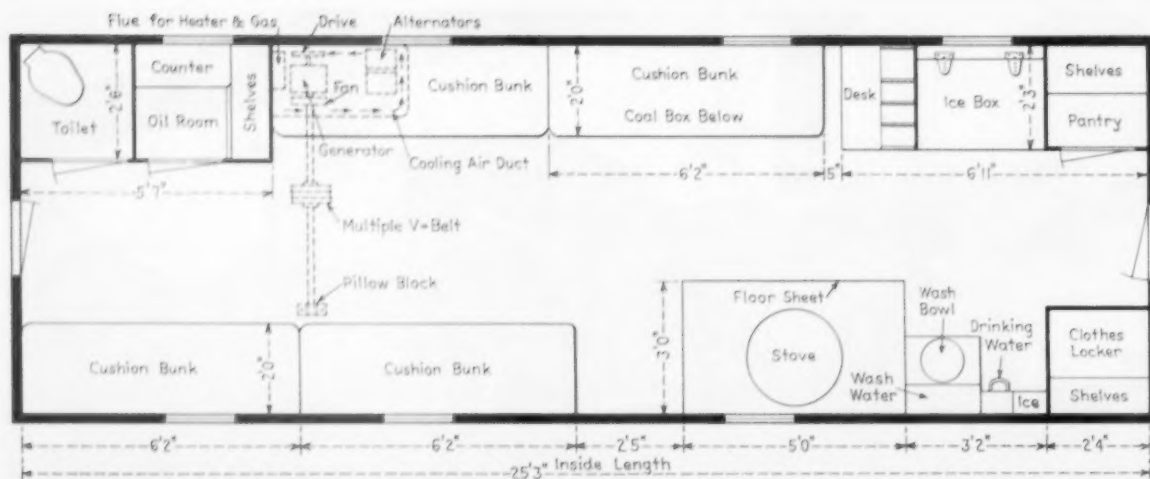
The car bodies are $\frac{1}{4}$ in. steel, all welded which results in simplification of manufacture and a better appearing job when completed.

The first caboose, No. 850, was erected and placed in service in 1948 to get the reaction of train crews that were to use them when the program got under way. The men were asked to comment on the car's riding qualities as well as its other features in order that the cabooses would be satisfactory and comfortable. As a result of this test period, a number of alterations was made in the original plans that could not have been foreseen.

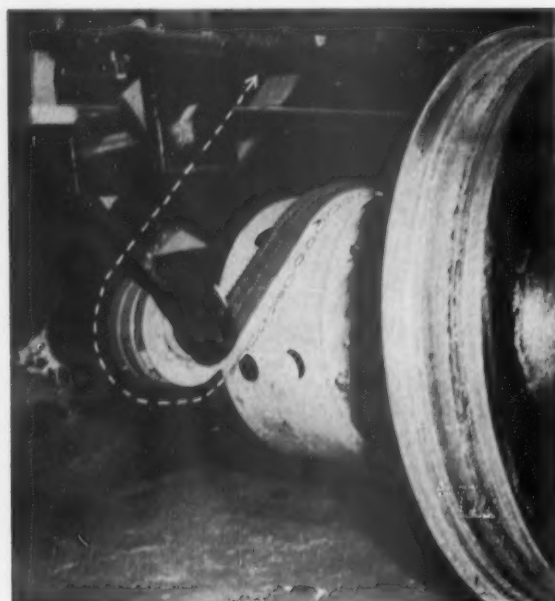
In this connection, shop employees and supervisors submitted suggestions to facilitate the production of the cars and provide additional safety features. These included

FEATURES OF THE NEW CARS:

- All-steel construction
 - Welded, insulated bodies
 - Axle-driven generators
 - Cast-steel underframes
 - Improved riding qualities
 - Aluminum sash—safety glass
-



INTERIOR PLAN of the new DL&W cabooses.



EQUIPMENT with which new cabooses are fitted to operate alternator-generator. Dotted line follows axle-driven belt up into body.

the rounding of square corners, repositioning of grab irons and other handrails. A coping over the windows was added to help keep out the rain.

In determining the type of caboose best suited for the Lackawanna's heavy grades and pusher service, it was decided to use as underframes the cast steel tender beds from retired steam power. This not only provided the necessary additional strength, but was an important economic consideration.

The underframe was fitted with a standard draft gear pocket on the forward end by welding and the height was adjusted to the caboose by a heavier body center plate and extended side bearings. A steel plate was installed as a floor.

The car body itself is almost entirely welded in sub-assemblies, such as sides, ends, roof and cupola, and these parts are then assembled on the underframe as a single

unit by welding. The sides, floor, ends and roof are insulated to keep out cold and heat, thus preventing abnormally high temperatures in the summer and providing a consistent temperature in the winter with a minimum of coal. The insulation also reduces track and wheel noise.

Over the insulation fir plywood was applied to the walls, ends and ceiling to provide a smooth interior. Pine was used for flooring. All lockers and cupboards are of welded steel construction.

The cars are equipped with aluminum sash, glazed with safety glass set in rubber and the side cupola sash slides forward and backward for the convenience of employees while watching their train.

The trucks are equipped with long elliptical springs and steel wheels for easier riding. The center plate is fitted with a fiber filler, $\frac{3}{8}$ of an inch thick, to keep truck noise out of the car.

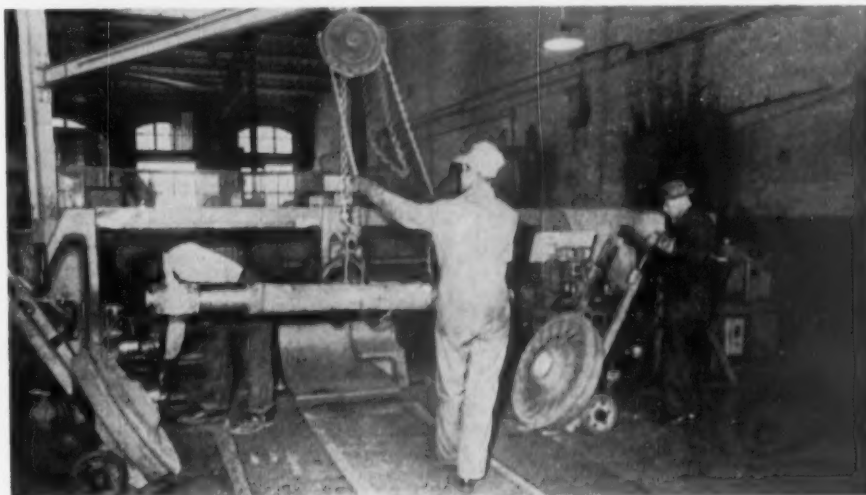
Cars Have "Zippers"

Each car is equipped with a device called a "zipper," which closes a valve in front of the angle cock and allows the pusher locomotive to cut off without stopping the train. The air brakes also may be released from inside the caboose by stepping on a floor release valve.

As the radio installation program for freight trains got under way 32 of the cabooses were scheduled to be equipped with alternator-generators to provide power for the radios. However, only 27 will have radios installed. As a by-product of this, electric lights are being installed in the 32 cabooses. A dome light is located in each end of the body of the car and another over the conductor's desk. The marker lights also are electric, with a part of the bottom cut away so that light shines on the steps. The lights inside have individual switches, and in addition another switch is located in the cupola so the ceiling lights can be turned off to reduce glare at night.

The alternator-generator is driven by a belt arrangement, operating off the axle and is so arranged that it will produce electricity regardless of the direction in which the caboose is operating. This obviates the necessity to turn the caboose at the end of a run. Storage batteries of sufficient capacity to carry the car from Scranton to Buffalo without failure of the system are used.

Ideas for the Car Repair Man...



Axles are delivered by jib crane and hoist, and wheels by chisel trucks.

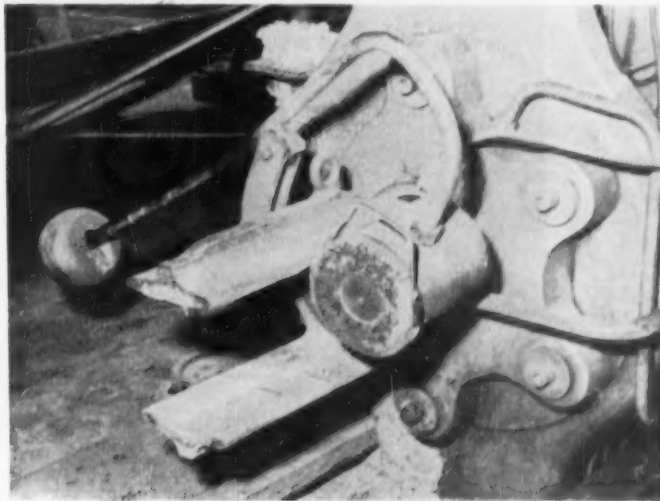
WHEEL PRESS DATES AXLES.—Means of applying car wheels to axles as developed in the Bayshore shops of the Southern Pacific, in San Francisco, Calif., serve to bring out the potentials of the wheel press. The axle is picked up from a supply of axles at one end of the press by a chain hoist on a jib crane, and is swung into a position in front of the press. Wheels are brought to positions at either end of the axle on chisel trucks.

Journals are protected with hinged guards, and wheel seats and axle bits painted with wheel mounting compound. With the wheels in the position, the axle is lowered until its ends rest in the wheel fit. Then the chisel trucks are tipped up to a vertical position until the

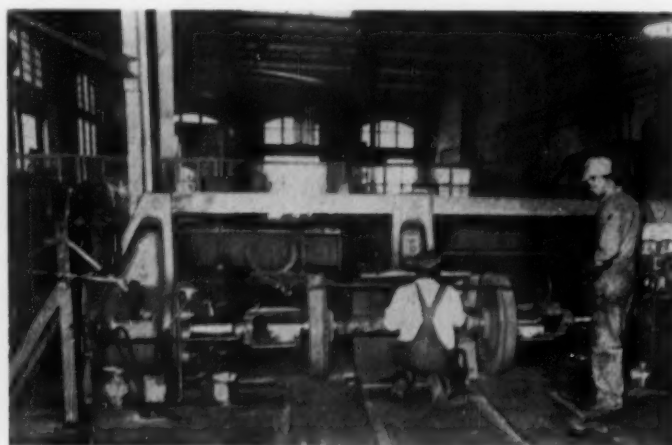
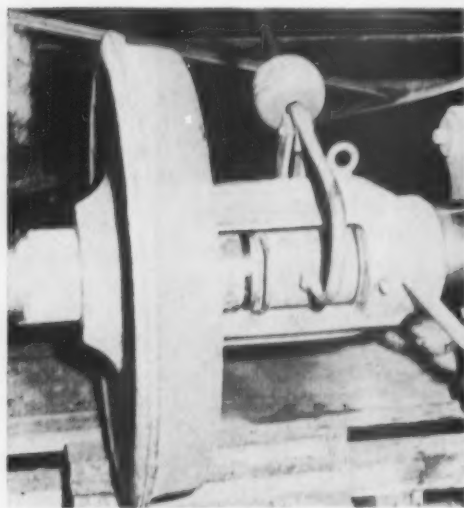
chisel edges rest on the floor. Then by pushing the one at the right forward, the wheels are slid onto the axle to a loose fit. This is made possible by a plate in the floor which slides laterally on roller bearings.

With the wheels on the axle, the loose assembly is rolled into position on the press. One wheel is pressed on at a time. This is accomplished by placing a space block against the axle at one end, while the wheel at the other end is pressed on by the press fork.

When the right-hand wheel is to be pressed on, a space block is held against the left end of the axle. When this is done, the swinging space block on the right end is swung out, and up.



A swinging space block has a counterweight which will hold it in either position.—A space block at one end permits pressing on a wheel with the press fork at the other.



The swinging block (left) carries a date stamp and the axle is stamped when the opposite wheel is applied. The wheels are pressed to gage (above) when the second wheel is applied.

When the left-end wheel is to be applied, the space block on that end is removed to allow the press forks to contact the wheel and the tilting block on the right end is swung down between the press forks.

The tilting block has two features. By means of the sliding weight, it can be made to remain in either position. Also inserted in the block are steel date stamps which are set into holes in the block, permitting a change

of date for each day. The proper stamp for all axles is thus assured.

The wheels are pressed to gage and the pressure required is recorded. Mounted wheels are rolled out of the shop on the tracks shown in the foreground.

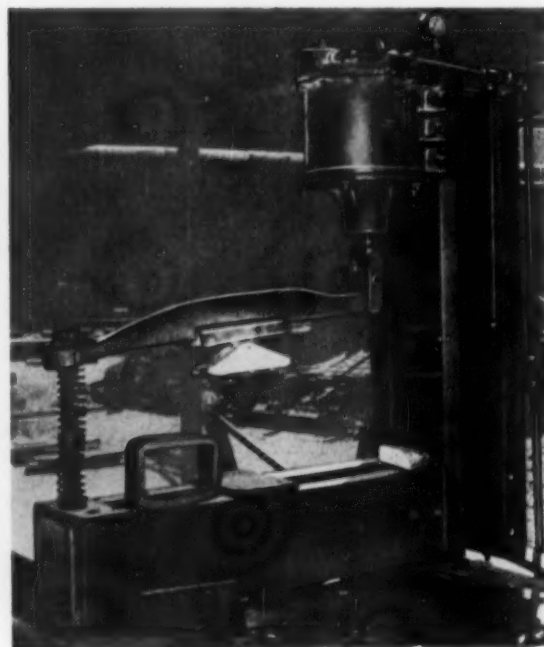
The press has a capacity of 600 tons, and is now used for car wheels. It will also be used for diesel locomotive wheels.

ELLIPTIC-SPRING COMPRESSOR.—Passenger-car elliptic springs can be compressed by a 16-in. air cylinder. The cylinder is mounted on a structure which has a base of two lengths of steel with a cross-section $1\frac{1}{2}$ in. by 5 in. on which rests two 13-in. channels. The cylinder, itself, is attached to two additional 13-in. channels, mounted vertically, which bolt to the base channels. The base channels are set 13 in. apart and are 6 ft. long; the vertical channels to which the air cylinder is secured are 5 ft. 9 in. high.

A car side bearing is pinned to the under side of the lever arm to take care of small irregularities in the positioning of the spring. The bolt that supports the free end of the lever arm is $2\frac{1}{4}$ in. in diameter and 39 in. high. A coil spring is wound around this bolt to hold the lever bar up to allow the elliptic spring to be placed on the press for being squeezed. The head of the bolt is attached to one of the $1\frac{1}{2}$ -in. by 5-in. steel pieces which form the sub base.

The springs are held in the compressed state by the clamp shown resting on the base. This is shaped with a bevel the same as the spring and fits on in one direction only.

Press for compressing passenger-car elliptic springs.



ELECTRICAL SECTION



FIG. 1—General appearance of locomotive.

New Haven Gets Rectifier Locomotives

By F. D. Gowans

■ In December 1954, delivery was begun on an order of 10 rectifier type locomotives for the New Haven. These are high-speed passenger locomotives, operating over the railroad's electrified line between New York City and New Haven, Conn.

Although quite similar in characteristics and performance to other type locomotives now being used in this service, the new motive power differs from them in many electrical and mechanical features. To appreciate these, it is necessary to understand the unusual nature of the New Haven passenger locomotive operation into New York City. The railroad's main line is electrified with an 11,000-volt, 25-cycle, single-phase, overhead a-c system from New Haven, Conn., to Pennsylvania Station in New York. From Woodlawn, going into Grand Central Terminal over the Park Avenue Viaduct, the line is electrified with a 660-volt, d-c third rail system. Passenger locomotives

must, therefore be designed for operation from these two power sources; must carry complete train heating equipment and supplies, yet must not exceed the axle loading limit of 58,000 lb. over the viaduct.

Application

Application

Until recently the use of rectifiers in railway applications, has been limited largely to substations furnishing direct-current power for use on locomotives and cars. The first large domestic application of rectifiers as part of the locomotive or car propulsion equipment began in 1954, when the New Haven received delivery of 100 m-u cars, equipped by the Westinghouse Electric Corporation.

In recent years, the d-c traction motor has benefited from intensive development for the diesel-electric locomotive. Facilities for quantity production, and experience

Abstract of a paper presented by F. D. Gowans, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa., before the Midwinter General Meeting of the American Institute of Electrical Engineers, held in New York, January 31-February 4, 1955.



FIG. 2—Three-quarter view of truck with motors assembled.

gained from thousands of motors in service have greatly reduced the manufacturing cost and maintenance expense of traction motors. The rectifier locomotives here described benefit from this development through the use of General Electric's standard GE-752 d-c motor.

General Description

The cab, of box-type construction with streamlined ends, is fabricated from sheets and structural shapes by welding. The cab sides are designed as load-carrying girders which support the underframe and equipment. Each end of the underframe is fitted with a pilot, rubber draft gear and tight-lock coupler. New Haven standard headlights, marker lights and number lights are built into the nose sheets.

TABLE I—LOCOMOTIVE DATA

Weight	
Total locomotive fully loaded	348,000 lb
Per driving axle	58,000 lb
Dimensions	
Track gauge	56½ in.
Length inside knuckles	68 ft
Height over cab roof	12 ft 8¾ in.
Height d-c trolley locked down	14 ft 9 in.
Height a-c trolley locked down	14 ft 8¼ in.
Width over cab sheets	9 ft 11½ in.
Width, overall	10 ft 5½ in.
Total wheel base	52 ft 6 in.
Rigid wheel base	15 ft
Length between center plates	44 ft
Wheel diameter	40 in.
Coupler height	34 in.
Clearance motor gear case to rail	4½ in.
Minimum curve	288 ft, 20 deg
Supplies	
Train heating water	1,500 gal
Train heating fuel	400 gal
Sand	20 cu. ft.
Ratings	
Traction force at 25 per cent adhesion	87,000 lb
Traction force continuous	34,000 lb
Speed at continuous rating	44 mph
Power at continuous rating	4,000 hp
Maximum speed	90 mph
Train heat boiler steam cap	500 lb per hr

A combined fuel and water tank for train heating supplies is hung below the cab underframe between the trucks.

Arrangement of equipment on the roof provides for an a-c pantograph mounted on a hatch cover at each end. These hatch covers are built as ducts. Ventilating air for the equipment is taken in from the side of these ducts at the roof level. The center portion of the roof is solid and carries the accelerating resistors and blowers.

Both ends of the cab are streamlined, with front windows above the curved hood, and windows at the same level on the side to give maximum visibility.

Side doors at both ends provide entrance to the operating cabs. Access to the roof is by means of an inside ladder and roof opening.

The cab is carried on two, three-axle, swing bolster trucks (see Fig. 2). All axles are motored. To provide room for the motor on the center axle, the centering plate is located between axles one and two. Spring loaded, sliding plates on each side of the truck frame between axles two and three also carry load and provide uniform distribution of weight on the axles.

Inside equalizers, supported on top of the roller bearing journal boxes, carry the cast steel truck frame on helical springs. The frame in turn carries the swing bolster and center plate on four swing links, spring plant and elliptical springs.

Foundation brake gear is designed for 75 per cent braking. Clasp brakes are employed with one cylinder for each wheel. Each cylinder is fitted with an automatic slack adjuster.

Location of Apparatus

Principal pieces of apparatus are shown in Fig. 3. Generally speaking, the small pieces, such as batteries, train control and air brake equipment are located in the end hoods. Here they are readily accessible, and easily connected to the equipment at the engineman's position.

Standard 24 RL air brake equipment is used. An air compressor with a rating of 200 cfm supplies the air. The two storage reservoirs, having a combined capacity of 75,000 cu. in. are located beneath the cab underframe, one at each end of the fuel and water tank.

Duplicate operating cabs with raised platforms at the

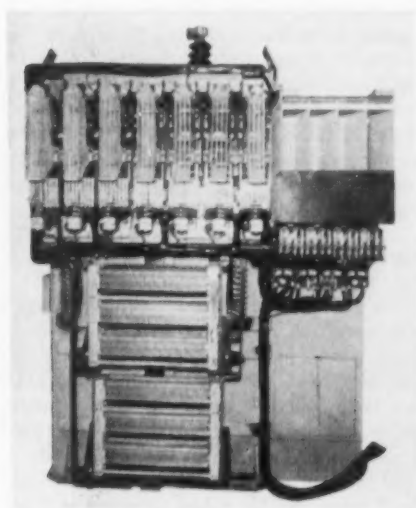
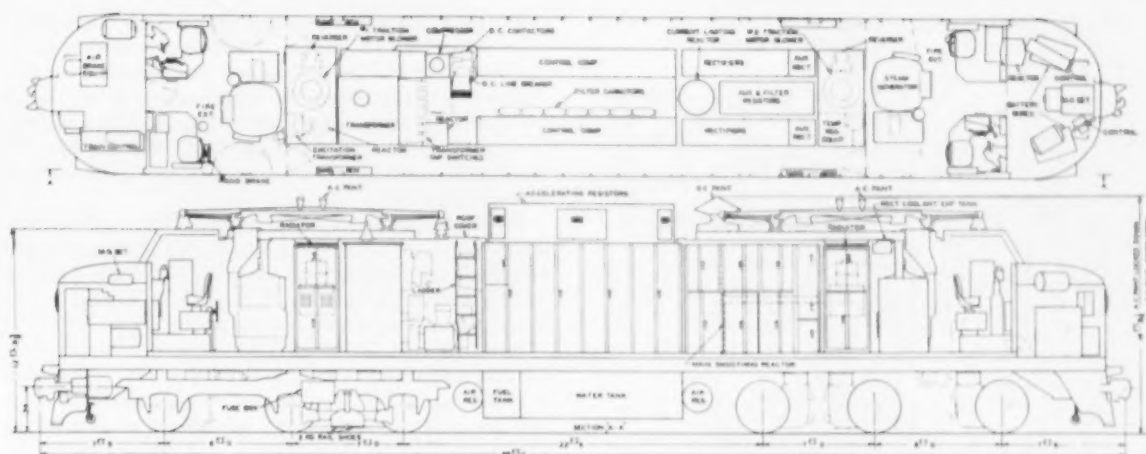


FIG. 4—Main transformer group ready for placement in the locomotive.

FIG. 5—Control unit consisting of two control cabinets with accelerating resistors and blower mounted above.

TABLE II—COMPARISON OF A-C AND RECTIFIER LOCOMOTIVES

Classification	2C + C2 00/000 + 00000	C-C 000 000
Year built	1937	1954
Type	A-C commutator motor	Rectifier
Service	Passenger	Passenger
Hp at continuous rating	4,000	4,000
Length over knuckles	77 ft	68 ft
Weight, lb		
Trucks	159,000	72,000
Cab and platform	72,000	93,000
Equipment	180,000	156,000
Supplies	21,000	27,000
Total	432,000	348,000
On drivers	270,000	348,000
Per driving axle	45,000	58,000
On guiding axles	162,000	
Per guiding axle	40,500	



FIG. 6—Rectifier cabinet—two are used per locomotive.

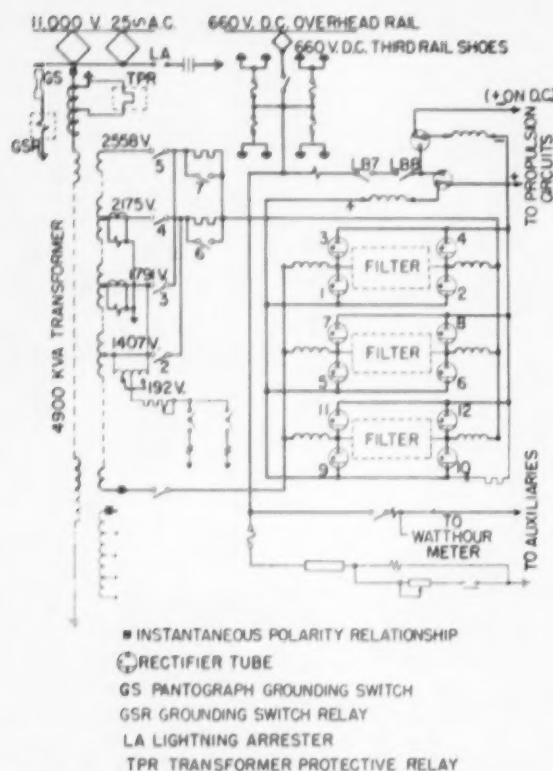


FIG. 7—Schematic diagram of main power supply circuits.

engineman's and fireman's positions, are located at each end of the main apparatus compartment. Controls, brake valves and other equipment are arranged for the safety and convenience of the crew. A steam generator having a capacity of 2,500 lb of steam per hr, is located in each cab. These two generators can be operated together or independently to meet the train heating requirements.

A bulkhead, with doors on each side, separates the operating cab from the main apparatus compartment. An equipment blower at each end of the apparatus compartment furnishes ventilating air for the traction motors, transformer, rectifiers and reactors. It also ventilates the rectifier cooling radiators. Air enters by means of the ducts in the hatch covers, passes through the rectifier cooling radiators into the equipment blowers which discharge it into a duct in the cab underframe. From here, it is distributed to the apparatus as required.

The main transformer, Fig. 4, is designed to utilize the full height of the cab. The high-voltage bushing on top protrudes through the hatch cover to confine the 11,000-volt circuits to the roof. Secondary taps and tap switches are mounted on one end of the tank. The transformer is liquid cooled by means of Pyranol. A motor-driven pump circulates the liquid through the tank and windings to a cooler on the right side of the tank. Ventilating air is forced through the cooler from the duct in the cab underframe.

All of the d-c control, together with auxiliary and changeover switches, is located in the two control cabinets, Fig. 5. Each cabinet faces a side aisle from which the equipment can be easily inspected and maintained. A center aisle between the cabinets gives access to the rear of each and to the filter condenser located there.

The control cabinet structure supports the accelerating resistors and blowers on the roof. This arrangement keeps the length of the leads between the resistors and the switches at a minimum. The resistors are of the ribbon type and are ventilated by means of motor-driven blowers connected across the resistors. With this scheme, the amount of ventilating air is proportional to the voltage across the resistor.

Twelve main circuit rectifiers and four auxiliary rectifiers, together with the firing circuit equipment, are arranged in the two rectifier cabinets, Fig. 6. The rectifier cooling system pump with its controls is located in the lower part of the blower compartment.

Standard eight-in. rectifier tubes have been modified for this application to provide heavier anode construction and changes in the mercury pool to assure ignition contact under the most adverse conditions of locomotive movement. Cooling water is circulated through the tubes, control valves and air-cooled radiators by means of a motor-driven pump.

Two reactors, located between the two rectifier cabinets, are air cooled from the main ventilating duct. One is an air core type reactor with six separate coils for limiting the arc-back current in each of the rectifier circuits. The other is an iron core reactor used to smooth the current ripple in the rectifier output to the traction motors. This is necessary for proper commutation of the motors. The auxiliary motors also have smoothing reactors for the same purpose.

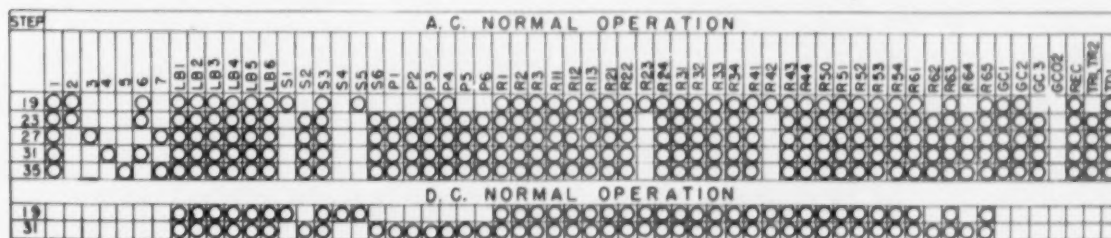
Electric Circuits

The main power circuit arrangement is shown in Fig. 7 and the propulsion circuits in Fig. 8.

In the a-c zone, power is supplied to the main transformer primary from the overhead trolley at 11,000 volts, 25 cycles. It is collected by means of two pantographs mounted on the roof. Either or both can be used as occasion demands. From the transformer secondary, power is supplied through tap switches and current limiting reactors to 12 main rectifier tubes arranged in three separate bridge connected circuits. Power output from the rectifier supplies six traction motors through the changeover switches, the main smoothing reactor, line switches and accelerating resistors. Arrangement of the traction motor circuit provides two motor combinations; three in series, two in parallel on the 1407-volt tap, and two in series, three in parallel on the three higher voltage taps. Voltage variation on the traction motors is obtained by means of the d-c accelerating resistors in the traction motor circuit in combination with the four transformer taps.

In the d-c zone, power is supplied from the third rail at 660 volts. It is collected by means of third rail shoes located on each side of both trucks. Connections are made from fuses through two line breakers and a change-over switch to the accelerating resistors and traction motors. Arrangement of the traction motor circuit provides two motor combinations; two in series, three in parallel, for starting and low-speed operation, and full parallel for high speed operation. Locomotive characteristics are shown in Fig. 9.

Change-over switches, located in the main power and auxiliary circuits and controlled from a single switch at the engineman's position, permit setting up the circuit for either a-c or d-c operation.



Auxiliary motors are designed to operate on 660 volts d-c. In the a-c zone an auxiliary rectifier supplies the power from a separate winding on the secondary of the main transformer. Four standard ignitron rectifier tubes arranged in a diametric connection are used. They are water cooled as are the main rectifier tubes from common cooling system. Smoothing reactors are employed in these circuits as well as in the main motor circuit.

Protection for electric equipment is of two general kinds: overload type for the transformer, traction motors and auxiliary motors; and ground relay type for both the main and auxiliary circuits. The rectifiers are protected by means of current limiting reactors in each circuit and an arc-back relay which removes excitation from the tube firing circuits.

AMPERES PER MOTOR

SPEED - MPH

CONTINUOUS RATING 4000 HP

FS-1 AMPERES

MAXIMUM POWER

TRACTION FORCE - THOUSAND POUNDS

PERCENT ADHESION

SPEED - TRACTIVE FORCE CURVE
RECTIFIER PASSENGER LOCOMOTIVE

61

The a-c commutator motor type locomotives, built for this service in 1937, weigh 452,000 lb. This load is carried on two three-axle, articulated driving trucks and two two-axle guiding trucks, making a total of 10 axles. The high load concentration resulting from the close truck and axle spacing limited the axle loads to 45,000 lb.

In a recent building program the Park Avenue Viaduct was modernized and its load carrying capacity increased. When the rectifier locomotive was proposed with all weight on two widely spaced 3-axle, swing-bolster trucks, it was approved for 58,000 lb per axle. With 6 axles, this means that the total locomotive weight was limited to 348,000 lb.

A weight comparison of these two types of locomotives, Table II, shows that the new locomotive weighs 84,000 lb less than the locomotive built in 1937 and has 74,000 more weight on drivers. The weight reduction is chiefly in the truck, with the reduced equipment weight offsetting the increase in cab and platform weight.

Recent application of sealed tube rectifiers on locomotives and cars is of significant importance in railway electrification.

In its present state of development, the rectifier tube represents a high power package that can be used effec-

tively in the transportation field. Its ability to convert commercial frequency a-c to d-c power for traction opens up many new possibilities for existing as well as future railway electrification.

Another bright spot in this picture is the program of intensive development and search for new materials and methods. New rectifier materials show promise of even more power in smaller packages with simple control and lower losses. Prospects of reducing costs are also good. These possibilities, together with the fact that highly developed components, such as traction motors and control equipment are available from the diesel-electric locomotives, offer means for reducing the first cost of electric locomotives, an item which has been a barrier to further electrification.

Weight of electric equipment for the rectifier type locomotive is approximately 10 per cent less than that for the a-c commutator type locomotive of the same horsepower rating.

Railroad modernization, combined with progress in both the electrical and mechanical aspects of locomotive design, have produced a new locomotive which has 29 per cent more weight on drivers, yet weighs 19 per cent less than the locomotive built for the same service in 1937.



THIS storage rack with compartments for 75 batteries on pallets is only one section. Compartments for 72 complete batteries are located

behind this. Power outlets are available on two lower tiers of this rack so that batteries can be kept up to full charge during storage.

New PRR Pittsburgh Battery Shop

■ The solution of battery maintenance, repair and storage problems involving four different types of batteries at the Thirty-Second Street shop of the Pennsylvania in Pittsburgh, offers many suggestions which can be employed by other battery users. This battery shop is one of the first ever set up and was organized by the Pennsylvania when passenger cars first were lighted with electricity. It is the major battery shop for the Central region

One of the railroad's first battery shops has kept pace with requirements and now maintains four types of batteries

of the railroad and receives diesel locomotive batteries, air-conditioning and car-lighting batteries, batteries used in signaling, as well as batteries from industrial trucks.



BATTERIES for air-conditioning and car-lighting passenger service and for diesel locomotive starting are placed on pallets in sets of four trays for ease in handling. Problem is to keep sets together during repair. Steel strapping bands them together as a unit on wooden pallets during storage and until they reach the equipment for which they are ordered.



FACILITIES for complete battery overhaul and rebuilding are available at the Thirty-second Street Shop, including lead-burning by an expert to reconnect a repaired cell.

Upon arrival at the shop, a battery is first cleaned and examined for cracks and other damage that might cause leakage. The leaky containers are repaired, which sometimes requires a new rubber jar or container from a stock of spare parts. If no visible damage to the battery is noted, the electrolyte level is brought up to the proper height and the battery is placed on charge at the finishing rate. If all cells are uniform in voltage, specific gravity is adjusted to its normal value. Using a portable test-discharge unit, mounted on a battery-powered platform hand-truck, the battery is then given a test discharge. Voltage readings of each cell are taken at regular intervals, to determine the condition of each cell, and to detect those cells which are not satisfactory. A simple diagram of the cells in the battery is made, on which is noted all pertinent information regarding starting and finishing specific gravity, voltages of each cell during test and temperature readings. If a satisfactory discharge test is not obtained on the first cycle, the battery is given two more test discharges. If the battery as a whole fails to give at least 80 per cent capacity, all pertinent data on the faulty battery is sent to the electrical engineer in Philadelphia, Pa., for recommendation on its disposal or reclamation. If only a few cells of a fairly new battery indicate low capacity, these individual cells may be replaced.

If inter-cell connectors are drilled to remove the individual cells, lead-burning equipment and expert personnel are available to return the connectors.

After a complete battery has been cleaned, test-discharged satisfactorily and painted, it is ready for storage or immediate service.

Batteries for passenger car-lighting and air-conditioning or diesel locomotive service are placed on pallets in sets of four trays for ease in handling in and out of the battery compartments on cars or locomotives. In large operations, such as the Thirty-Second Street shop, it is somewhat of a problem to keep the original sets together as a unit. This is easily accomplished by securing the

four trays together with steel strapping on a wooden pallet.

There is considerable storage space for batteries in the shop, one large storage rack consisting of 72 bays (4 high), with each bay accommodating one complete battery on standard wooden pallets. There is another large storage rack of 75 bays arranged in three tiers each. Realizing the importance of sending out batteries in a fully charged condition, the first two tiers in this storage rack are fitted with charging outlets so that batteries can be given a booster charge periodically if they are stored for a long time or just before they are shipped. The lowest tier is often used for batteries undergoing test discharging.

Power for battery discharging is obtained from two motor-generator sets which can furnish up to 1,000 amp. The power distribution system within the shop is very flexible. There are outlets at convenient points on the charging tables for the smaller batteries as well as outlets throughout the storage rack mentioned above.

Depending upon the season, this shop handles up to 20 sets of batteries per week. The summer season is the busiest because of the heavy load put on the air-conditioning batteries during the summer months.

The generator which charges the car-lighting and air-conditioning batteries while the car is traveling on the rails is driven by a belt or mechanical drive from the car axle. It is impractical to adjust the voltage regulator while the car is in service. An efficient, portable rig for simulating operating conditions has been devised by A. N. Fox, assistant foreman, consisting of a 220-volt a-c motor to which is attached a flexible shaft with a clamp on the end. Mounted on wheels, the rig is placed in the proper position beneath a passenger car in the yard and the motor is plugged into a nearby power outlet. The belt connecting the charging generator to the axle of the car is disconnected and the clamp on the end of the flexible shaft is connected to the generator. The reversible motor is brought up to speed in both forward and reverse directions while the voltage regulator inside the car is adjusted.

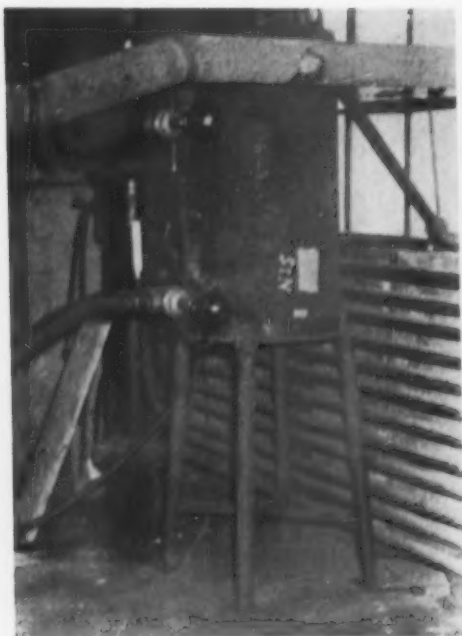


Fig. 1 (upper right)—The shipping stand provides a safe way to ship car engines without damage.

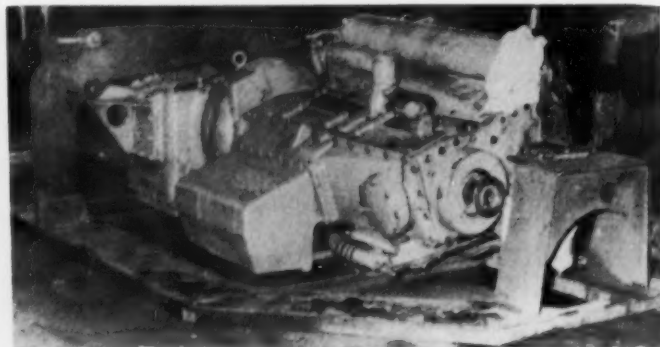


Fig. 2 (above)—The temperature of the jacket water which flows through this tank is controlled by a thermostatic valve which admits tap water to the tank.

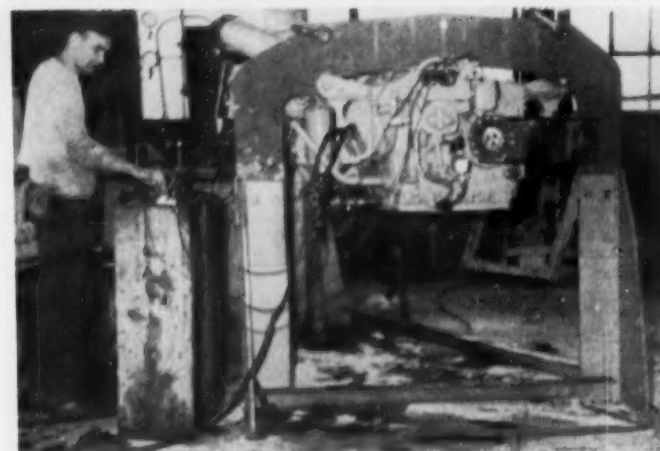


Fig. 3 (right)—End view of the test stand showing the torque arm (at the right) which is used to lock the transmission.



Fig. 4—End view of the stand shown in Fig. 1.

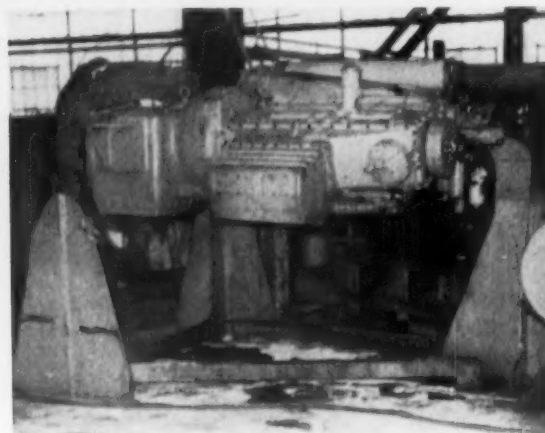


Fig. 5—The test stand is used for testing and light repairs.

B & M—Developed Stands Ease . . .

R.D.C. Engine Shipping & Overhaul

■ No General Motors power plant, used on Budd R. D. C. cars on the Boston & Maine, has been damaged in shipment since the railroad developed the shipping stand shown in Figs. 1 and 4. Engines due for overhaul are

removed from cars at Boston, Mass., and Westboro, N. H., and shipped to the North Billerica, Mass., shops for repair.

If an engine is ready for overhaul when it arrives at

the shop, it is stripped and given general heavy repairs. When reassembled, it is placed on the test stand shown in Figs. 3 and 5. From the illustrations, it may be seen that the yoke which supports the transmission end of the power plant is a part of the test stand as well as the shipping stand.

If the engine is in need of only light repairs, they are made on the test stand. Being able to run the engine on the test stand aids materially in making an accurate diagnosis of engine requirements.

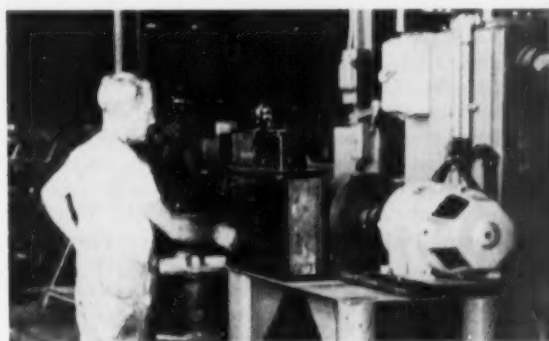
Following either light or heavy repairs, the engines are tested with their transmissions. For this purpose, the torque arm which may be seen at the right in Fig. 3, is used to lock or hold the drive-shaft end of the transmission.

The engine is tested at idle and three running speeds with the torque converter acting as a load. Finally, the torque arm is removed and the engine is brought up to a

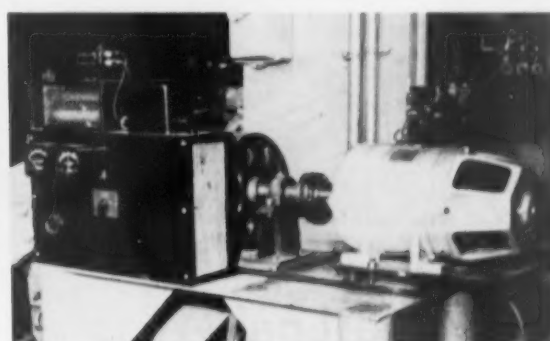
speed, equivalent to road operation, of about 50 mph which causes the transmission to go into direct drive. This action cannot take place while the transmission is being used as the load, since the necessary relay action is instigated by car or drive-shaft speed.

For the purpose of engine control during tests, knife switches are used to take the place of controller contacts. These are shown on the box at the left in Fig. 3. The engine is run for periods up to eight hours while records are made of water and transmission oil temperature and settings are made to insure proper operation of high temperature and low oil pressure switches.

During the test, the engine jacket water is circulated through the tank shown in Fig. 2. City water is also piped into this tank and there is an overflow at the top. A thermostatic valve, governed by jacket water temperature, controls the temperature of the water in the tank by controlling the amount of city water admitted to the tank.



LEFT—Motor on the eddy current brake test stand. RIGHT—The test panel is equipped with a brake excitation rheostat, voltmeter



and ammeter showing motor load. A flame ignition transformer and spark gap are mounted atop the test panel.

Eddy Current Brake Assures Motor Performance

■ When a steam generator motor is overhauled and returned to service from the Santa Fe's San Bernardino, Cal., shops, the operators know it is in first class condition and that it will carry load in excess of its rating without damage to the motor. The motor is used to drive a blower, a fuel pump and a water pump, and there is also a 50-volt, 60-cycle take-off which supplies the primary of the flame ignition transformer. The secret of accurate testing and adjustment is a shop-made, eddy current brake.

When a motor is to be overhauled, it is dismantled, cleaned with a steam jenny, dried in a baking oven for 24 to 48 hours at 300 deg F and checked for grounds and shorts. If its condition is satisfactory, the commutator is turned and undercut and the armature is dipped in insulating varnish and baked for 24 hours at 300 deg F.

Bearings are cleaned in a degreaser with trichlorethylene. Re-usable bearings are packed with lightweight, high-temperature silicone grease.

The eddy current brake, which is driven by the motor under test, consists of a steel wheel or drum open at one end. Inside the drum, and supported at the end away

from the motor, is an exciting field consisting of a ring of electro magnets. These magnets produce eddy currents in the wheel and create torque or drag on the motor. The amount of torque is controlled by a rheostat on the test panel which controls the amount of excitation. A series of holes in the face of the wheel provide ventilation for removing the heat generated by the eddy currents.

A flexible coupling between the motor and the brake makes attachment easy, and allows for any minor misalignment. The brake is excited with current values up to 5 amp. at 74 volts. During test, the motor is protected by a time delay relay.

When a motor to be tested is connected to the brake, it is started with a step starter, and run at no load on 74 volts. Load is applied and increased gradually to 85 amp. Speed is measured with a hand tachometer and brushes are advanced or retarded until it is 1,800 rpm. To obtain this speed at this load, it is necessary to relocate the brushes from their original position.

The motor is then loaded to 120 amp—100 per cent overload—for 10 to 20 seconds, while a check is made of commutation. If there is no arcing, its condition is considered satisfactory.



A PIECE of carbon paper folded inside white paper will show area of contact in contactors.

Why the Load Was Lost During Transition

By Gordon Taylor

■ About the middle of July, Unit 5039 had several reports of ground relay action, and a flashover of all traction motors with a flashover of the main generator.

The motors and generator were given a thorough cleaning. A test then developed the fact that the wheel slip relay was inactive at the time of ground relay action, due to a broken wire running from the EF interlock to the bus bar on S-14 and the P-1 contactor. The broken circuit was repaired and the unit returned to service.

Later, reports began coming in saying that the engine would drop load during transition from No. 2 to No. 3. Several inspections were made, but nothing definite was found to be the cause of trouble.

Finally a fireman reported as follows:

In making transition from No. 2 to No. 3, the engine drops load as soon as load meter shows about 300 amp. The wheel slip relay also closes, but wheel slip light does not burn. That was the best tip that had been received. The unit was moved into the shop for a thorough test to locate the trouble. It was first necessary to ask and find answers to a few questions.

The first question was why did the wheel slip relay

close and wheel slip light fail to burn? That was easy, the lamp was burned out.

The second question was, if the wheel slip relay closed, what did that have to do with engine unloading? It is the wheel slip relay's job to unload the engine, and it was doing its job as intended when wheel slip occurred.

The third question was, why did wheel slip occur during transition from No. 2 to No. 3? The fireman had stated that the engine would unload when the current reached about 300 amp. The problem was then to locate any condition which would cause one of the two wheel slip relays to pick up due to a difference in potential of the points across which it is connected.

Since the traction motors had recently been involved in flashover trouble, they were very carefully rechecked to be certain they were in good condition. They appeared to be okay, so a very careful check was made of the control system and power panel.

Since there was no trouble reported in transitions No. 1 and No. 2, special attention was given to all contacts that would come into action when the circuits were set up for transition No. 3.

When the parallel contactor P-2 was examined, it was found that the contact tips were not making contact across the full face area of contacts. In fact, the contacts were touching only along the outer edge at one side, an area of about one fifth of the contact face. This poor contact could very well explain the unbalanced condition in the motor circuits that caused the wheel slip relay to act every time the P-2 contactors closed when making the No. 3 transition. It was then decided that the P-2 contactor was the villain in the case.

After the power contactors were all checked and placed in proper contact, the unit was given a road test and gave very satisfactory performance.

When the power contactors were examined, it was found that a piece of stiff paper could be inserted for a considerable distance between closed contacts. To check on that, a piece of carbon paper was folded with carbon sides out, and laid within a folded strip of white paper that was of a width that could be passed between power contacts.

The power contacts (with power off) were closed by air pressure. When the carbon and folded paper were removed from the contactor, a perfect imprint was on the paper, showing the area of contact. This revealed that there was contact on only about one-fifth of the area.

The question arises as to why contacts were out of line. It was found that two bolts that fasten the upper contact holders had to be loosened and the holder frame was moved into position so that the main power contacts would make contact across the entire area. This was much better than attempting to file the contacts to make full face contact.

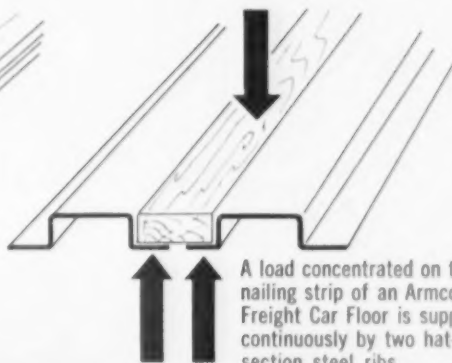
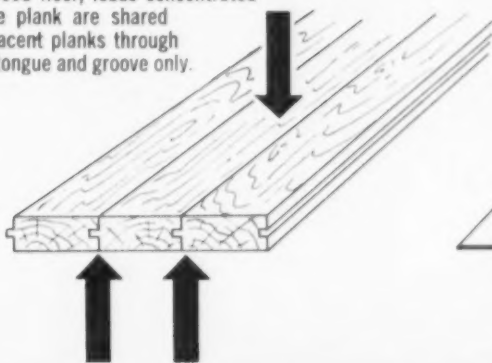
It is, therefore, recommended that when new power contacts are applied that a careful check be made to be certain that contacts are making as full contact as possible by making carbon paper impressions.

It is also recommended that wheel slip lamps be checked periodically to see that they are in working order. Had we known in the beginning that the wheel slip relay was involved, it would not have been difficult to locate the trouble.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

Why **Armco Flooring** Keeps Freight Cars Rolling

In a wood floor, loads concentrated on one plank are shared by adjacent planks through wood tongue and groove only.



A load concentrated on the nailing strip of an Armco Freight Car Floor is supported continuously by two hat-section steel ribs.



WARNING!

POOR FLOORING—We suggest that you use steel plates on the floor of this car if you are going to unload with heavy trucks. We sincerely regret having to ship our product in railroad cars with questionable flooring. However, rather than delay your shipment indefinitely, we feel sure you will use the same judgment and care we did. This car was loaded by heavy electric trucks.

(Above is placard recently found by consignee in a box car. The conscientious shipper had placed it there—he had no other way out.)

Armco Freight Car Flooring is **designed** to take the heavy pressures of modern lift trucks. Wood floors were never intended for wheel loads up to 10,000 pounds (20,000 pound axle loads), as are common on fork truck loading. Consequently, when a single box car plank 1¾ inches thick is called on to resist such a load, the result is often a break-through.

Armco Freight Car Flooring is a composite steel and wood flooring for gondola, box and flat cars. It is designed both for

new construction and for replacement of worn-out wood or steel-plate floors in existing cars.

The Armco floor consists of formed steel ribs and wood planks laid alternately. The steel ribs are hat-sections and their top surfaces form part of the floor. Ribs are welded to the car frame. The heavy wood planks are nailing strips, fastened with bolts.

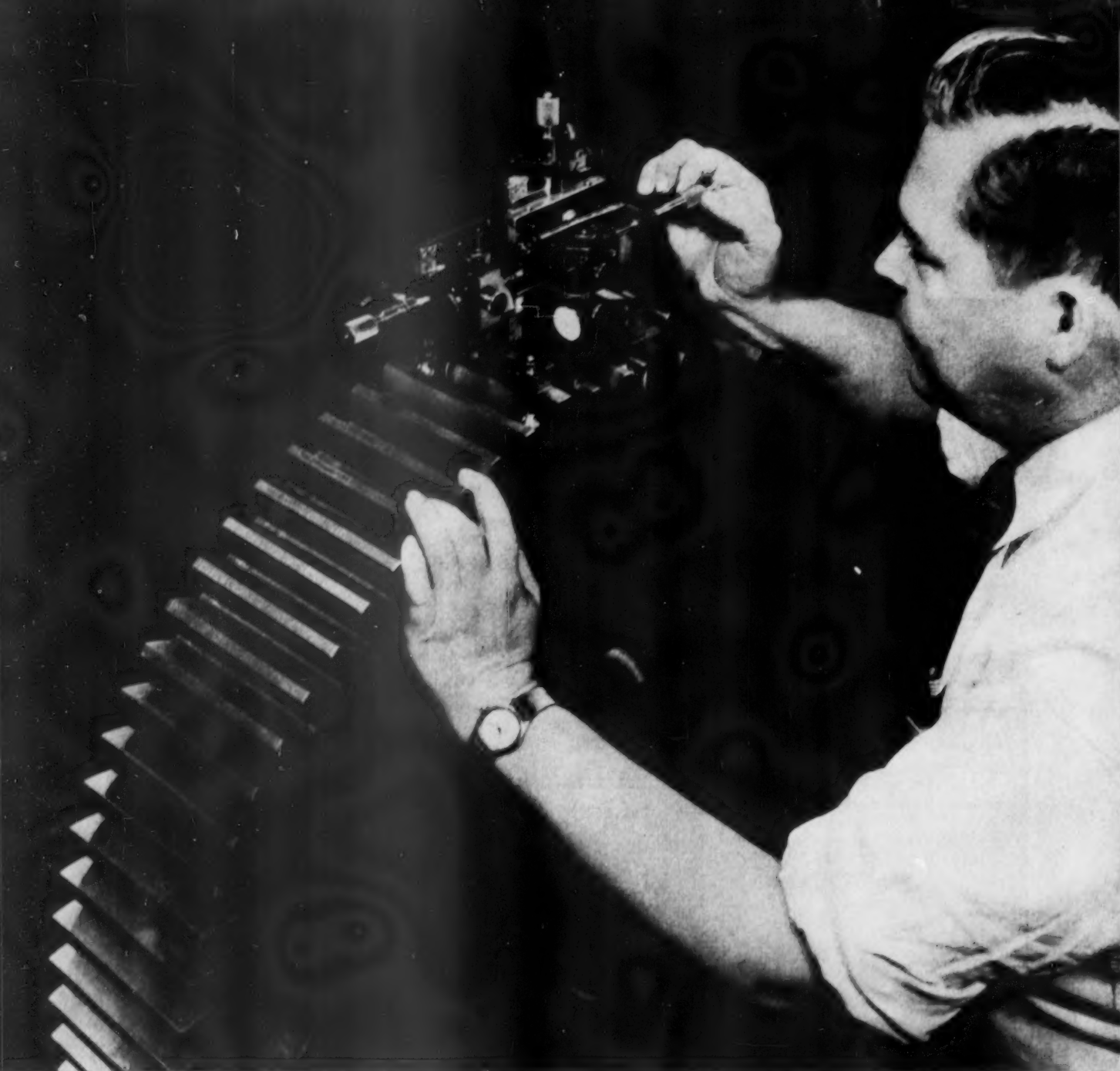
For further information write for the booklet, "Armco Freight Car Flooring," at the address below.

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SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION



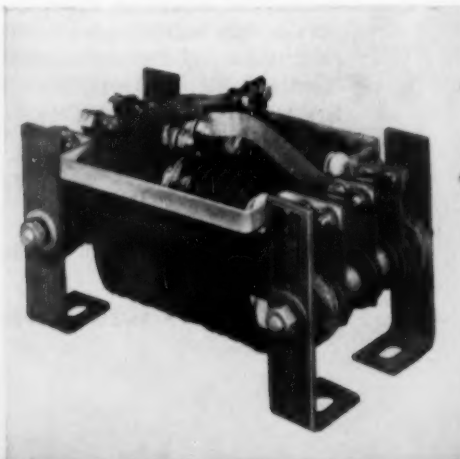


Using a precision involute checker developed by G.E., a quality control expert inspects a gear to make sure teeth have the accuracy necessary to resist fatigue failures.

2. GE-RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and tear on commutator surfaces.

3. G-E MOTOR SUSPENSION BEARINGS give long life—have an oil-return feature which can save up to \$85.00 per locomotive unit annually.

4. G-E RESISTORS have floating steel backbones that expand and contract freely with high temperature changes and therefore are not subject to buckling forces.



7 G-E replacement parts for better locomotive operation.



1. G-E GEARING is specifically designed to help cut maintenance costs. This GE-developed pinion stand permits inspectors to perform a quick check on all pinions for pitch line runoff, parallelism of teeth with bore, outside diameter, and tooth thickness.

How your maintenance costs are cut with General Electric quality-controlled gearing

Because they are checked and rechecked throughout all phases of manufacture, General Electric gears and pinions can carry the heavy starting loads and take the running shock loads encountered in heavy freight and high speed passenger service. Through G-E quality control, you'll save maintenance dollars when you specify genuine G-E gears and pinions for your locomotives.

Backing up intensive quality control, G-E

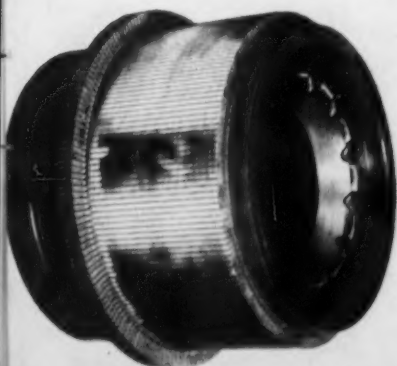
metallurgical research has developed materials to resist fatigue failures and to provide long-life gearing. With a combination of high hardness, superior strength, and the highest degree of accuracy, G-E gears and pinions give "new equipment" performance longer.

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5. G-E COMMUTATORS retain smoothness in service because high-speed, high-temperature seasoning process sets segments firmly in place.



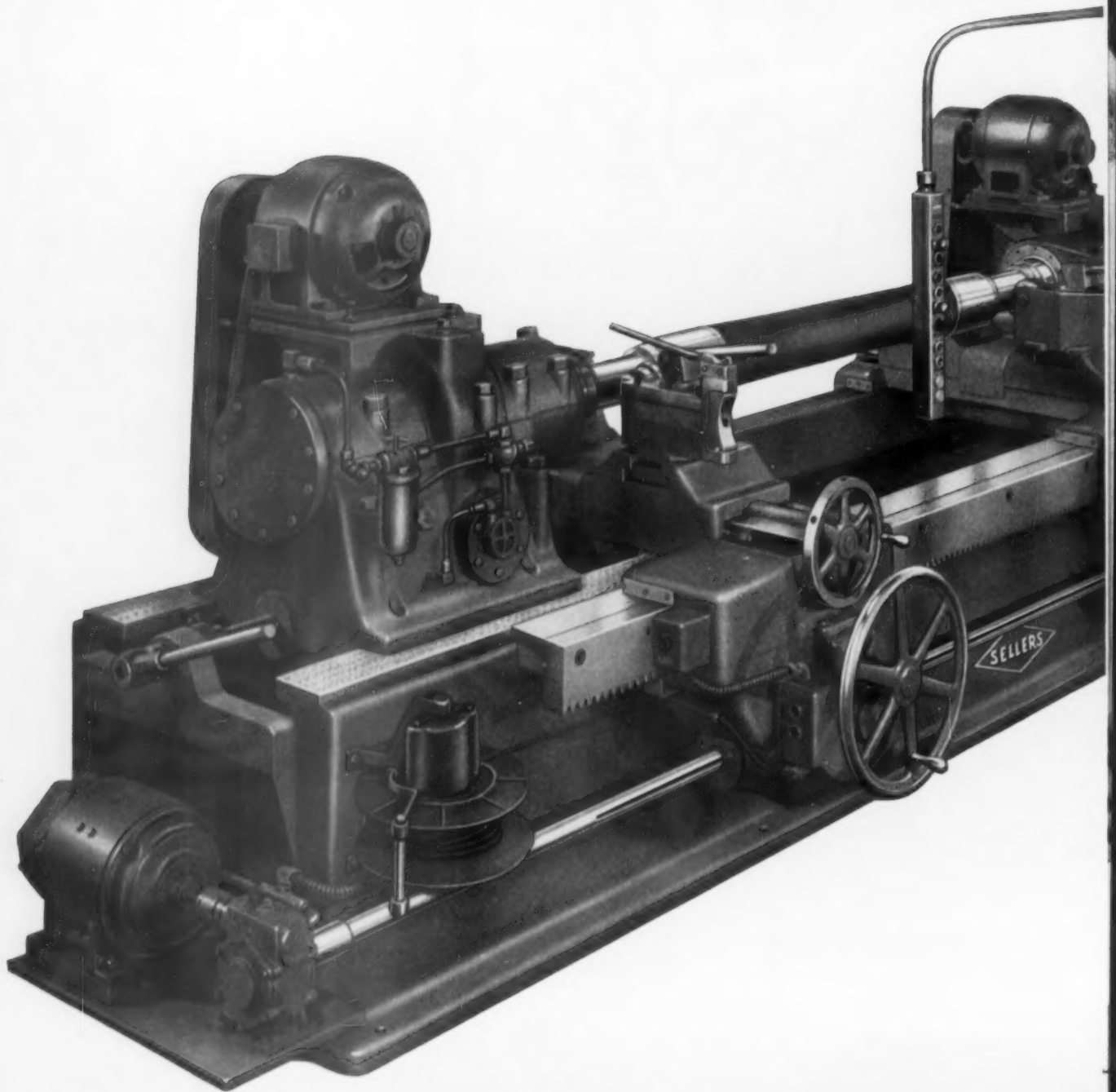
6. G-E ARMATURE COILS are available as part of complete rewind kits for your convenience. Every coil is dimensionally accurate and quality insulated for longer life.



7. G-E CONTACT PARTS break circuits quickly with minimum metal transfer because G.E. gives attention to the smallest parts.



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**New or used, car or diesel, can
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These lathes will:

1. Finish turn and burnish all new and second-hand A.A.R. Friction Bearing axles.
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Roller bearing car and diesel axles can be finished completely from end to end in one chucking. You do not turn them around and machine one end at a time. And, furthermore, you have two carriages cutting simultaneously.

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Only the Sellers End Drive Axle Lathe can do *all* your axle jobs.

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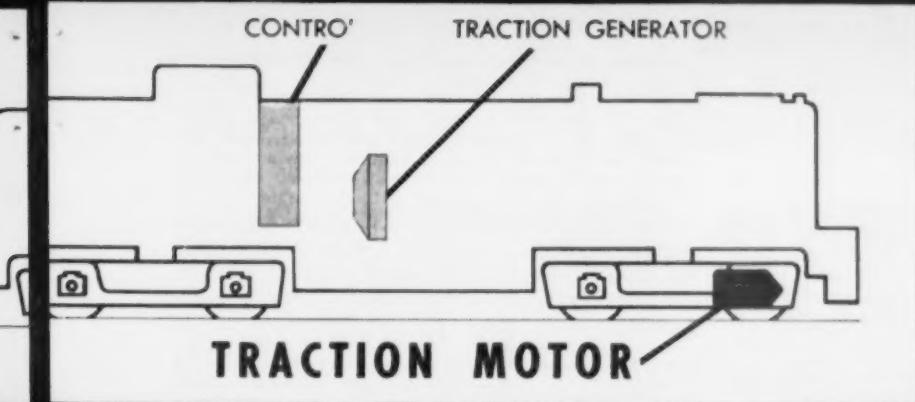


MORE WORKING MATERIAL in GE-752 motor (12 percent heavier than any other motor offered for standard application) means higher ratings. The effective use of additional active copper and iron results in the most powerful traction motor available today.

GENERAL  ELECTRIC

SHUNT

3 REASONS WHY THE G-E TRACTION SYSTEM SETS THE INDUSTRY STANDARD



THREE SUPERIOR COMPONENTS, installed as an integrated system, help you get rugged, flexible motive power that assures better locomotive utilization and easier maintenance.

G-E traction motors give you 15% MORE CONTINUOUS TRACTIVE EFFORT

In day-to-day operations, the heavier loads consistently go to locomotives with G-E traction motors. The GE-752 motor gives you 15 percent higher continuous tractive effort, at comparable gearings, than any other motor offered today. This extra capacity accounts in large measure for its record of low maintenance costs and low percentage of failures.

MOTOR OVERHEATING ELIMINATED

With 65-mph gearing, the GE-752 is the nearest thing yet to a self-protected traction motor. Unless your operation is most unusual, you can forget about short-time ratings with this gearing. Motor torque will slip the wheels long before the current developed is high enough to cause motor failures.

HIGHER LOCOMOTIVE UTILIZATION POSSIBLE

The capacity of this traction motor is helping many railroads attain better locomotive utilization, an important factor in lowering operating costs. For example, when your locomotive is equipped with G-E motors geared to 75 mph, it still has a high enough continuous tractive effort to permit dual-purpose operation. In most cases you have the speed to meet express and passenger schedules without sacrificing the tonnage-hauling capacity for freight. Locomotives with GE-752 motors geared to 75 mph are equally adaptable to divisions with level runs and those where mountain grades are encountered.

Ask your G-E Apparatus Sales representative for more information about this motor—one of the superior components of the traction system that sets the industry standard. General Electric Co., Schenectady 5, N. Y.

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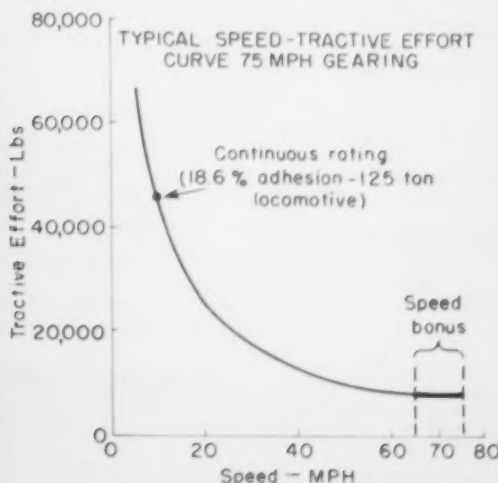
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SEPARATELY MOUNTED PINION requires lower maintenance. Largest in standard use, 4 3/4-in. pinion shaft reduces chance of fatigue breakage.

DUAL-PURPOSE 75-mph gearing of GE-752 motors provides continuous tractive effort into the self-protecting slipping range, as well as a bonus of 10 mph in top speed.

LARGEST PINION-END BEARING in railroad use can take heaviest duty. Sealed bearing needs no inspection between overhauls.



Questions and Answers

Interchange Rules

This is the fourteenth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

151-Q—Why was the former allowance of 3% for vacation expense specified in Paragraph (g-4) of Rule 2 changed to 4% in the 1955 Code?

A—Because of similar change in A.A.R. labor rates brought about by present payments now made certain holidays not actually worked.

152-Q—Does the addition of new Paragraph (3) to Section (s) of Rule 3 mean that on and after January 1, 1956, cars built new or rebuilt shall be equipped with automatic type slack adjusters complying with A.A.R. Standard Specifications and having Certificate of Approval?

A—No. This new paragraph simply requires that where car owners voluntarily elect to equip their cars on and after January 1, 1956, with automatic slack adjusters such slack adjusters comply with A.A.R. Standard Specifications and be covered by A.A.R. Certificate of Approval.

153-Q—Why is it so important that hereafter all car owners arrange to check the condition of initials and numbers of their freight car equipment before cars are released from their shops or their principal repair tracks?

A—Because under the provisions of new Paragraph (s-8) which was added to Rule 3 cars offered in interchange from owners on and after January 1, 1956, may be rejected by receiving road where stenciled initials and numbers are not legible.

154-Q—Is it permissible to use the new design Wabcoval Angle Cock on Cars which move in general interchange service?

A—Yes. See Interpretation No. (a-4) to Rule 17; also note following Item 2 of Rule 101.

155-Q—What is the purpose of new Rule 27 which was added in the 1955 Code?

A—To provide for periodic dismantling of geared hand brakes for the inspection of internal concealed parts so as to be able to correct any adverse conditions and thereby insure more efficient hand brakes in service.

156-Q—Why was new Paragraph (a-1) added to Rule 61 in the 1955 Code?

A—To indicate that all car owners are expected to periodically remove trucks from under their cars and dismantle same to the extent necessary for complete inspection of all details for the purpose of detecting and correcting all conditions which may contribute to hot boxes or other truck failures.

157-Q—Why is it important that the requirement with respect to Alternate Standard tubular axles as outlined in new second paragraph of Rule 84 be closely observed?

A—Because the strength of a tubular axle depends on heat treatment when manufactured and subsequent overheating of journals can and does reduce its original strength characteristics to an undesirable extent. (Incidentally, tubular axles are no longer being manufactured.)

158-Q—Why are certain draft gears sometimes transferred from Section I, List of A.A.R. Approved Draft Gears, Rule 101, to Section II, List of Non-Approved Draft Gears, in the same Rule?

A—Because check tests of such gears at the A.A.R. Laboratory after specified periods of service have developed losses in certain requirements necessary for A.A.R. Approved Drafts Gears under existing Specifications.

159-Q—Under what conditions may a straight labor charge be rendered versus car owner for lowering and raising auto loading device rack in car even though performed primarily for inspection purposes?

A—In cases where inspection of such lowered rack discloses necessary repairs and such repairs are made thereto, an additional labor charge of 0.2 hr. is permissible for the raising and lowering work.

American Locomotive Diesel-Electric Locomotives

This series of Questions and Answers pertaining to Alco diesel-electric locomotives with General Electric electrical equipment is a continuation of a series, the first of which was published in the October 1950 issue of Railway Mechanical & Electrical Engineer. The references to manuals and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

1137-Q—What action follows?

A—Remove locking wires from studs. Pry off catcher. Be sure not to nick its inner surfaces.

1138-Q—What attention should the oil catcher receive after removal?

A—Clean with suitable solvent, making certain that the oil catcher grooves and oil return channel to the crankcase are clean.

Installation

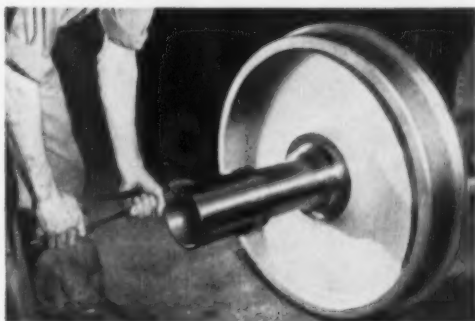
1139-Q—How should the oil catcher be located?

A—When applied to the generator adapter, it should be centrally located with respect to the crankshaft flange.

1140-Q—Describe the operation to install the oil catcher.

(Continued on page 78)

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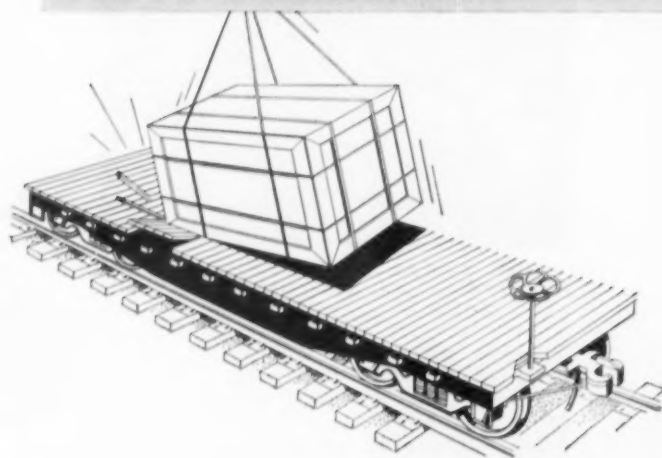
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PRESSURE-TREATED CAR LUMBER

Questions and Answers

(Continued from page 74)

A—Renew the gasket. Install the ream bolts if old oil catcher is reused with former adapter.

1141-Q—What should be done if a new oil catcher is used?

A—Center oil catcher with respect to crankshaft flange, drill, ream and apply ream bolts. Replace nuts, tighten and apply cotter pins. Replace nuts on all of the studs, tighten and lock wire.

Traction Generator

(Manual TP-500 page 512)

1142-Q—How are the generator fans balanced?

A—Dynamically, and may or may not have weights installed in place.

1143-Q—When equipped with welded weights, should they be removed?

A—The welded weights should not be removed under any circumstances.

1144-Q—Are the fans interchangeable?

A—Yes, on all generators.

1145-Q—What is done to provide for addition of weights if necessary, for balancing the diesel?

A—There are also three sets of holes drilled in the fan, 120 degrees apart, to be used for this purpose.

1146-Q—Which installations do and which do not require additional balancing?

A—Generators with gear driven auxiliaries do not require it, but it may be required on generators with belt driven auxiliaries.

Removal—Generators with Belt Driven Auxiliaries

1147-Q—What should be done preparatory to removal of generators with belt driven auxiliaries?

A—Set the crank nearest the generator on vertical top center.

1148-Q—How is this done?

A—Use a tram between the holes in the turning device housing and the worm gear, or by setting the No. 1-6 (12-cylinder engine) or 1-8 (16-cylinder engine) midway between pointers (22½ degrees from each pointer). Mark the edge of the generator fan and the generator frame.

1149-Q—What is the purpose of these marks?

A—These marks will insure the proper location of the balancing weight holes in the generator fan with relation to the crankshaft when applying the generator to the same engine.

All Generators

1150-Q—What is the initial operation to effect removal of all type generators?

A—Apply lifting hoist and take slack. Insert cardboard or similar material in air space between armature and field poles to prevent armature dropping when generator spider flange is disengaged from the crankshaft flange.

1151-Q—Describe the operation further.

A—Remove generator coupling bolts and bushings through engine base doors nearest adapter. Remove nuts from generator adapter studs that secure generator to adapter.

1152-Q—What is the final operation?

A—Pull generator from adapter using pry bars whenever necessary to guide generator and prevent it from binding. Remove upper shims, tagging them so that they may be reapplied in their original position.

Installation—Reapplying to Same Engine with Belt Driven Auxiliaries

1153-Q—Describe the initial operation for reapplication to the same engine.

A—Rotate engine crankshaft until the crank nearest the generator is on top vertical center. Align mark on generator fan with that on generator frame. Insert cardboard or similar material in air space between generator armature and field poles.

1154-Q—What operation should follow?

A—Attach slings and mount generator on adapter studs. Coat the couplings bushings lightly with white lead. Install bushings in the holes in crankshaft flange.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F146-Q—Describe this breaker further.

A—It is of the double throw type and also energizes the auxiliary generator field and exciter battery (4 pole) field.

F147-Q—What takes place if this breaker trips?

A—The engine will starve for fuel and the ac failure alarm will come on.

F148-Q—What is the color of the surge relay light and where is it located?

A—The color is white. On some units this light is located on the forward side of the electric cabinet. On A units it is in the operating cab behind the engineer.

F149-Q—Name the colors of the other lights.

A—Ground relay, white; low oil pressure, yellow; a.c. failure, blue; hot engine, red; steam generator off, green; stuck starting contactor, white (provided only on Railroad Specification).

F150-Q—What are the positions of the Isolater lever?

A—Start, Isolate and Run.

(Continued on page 82)



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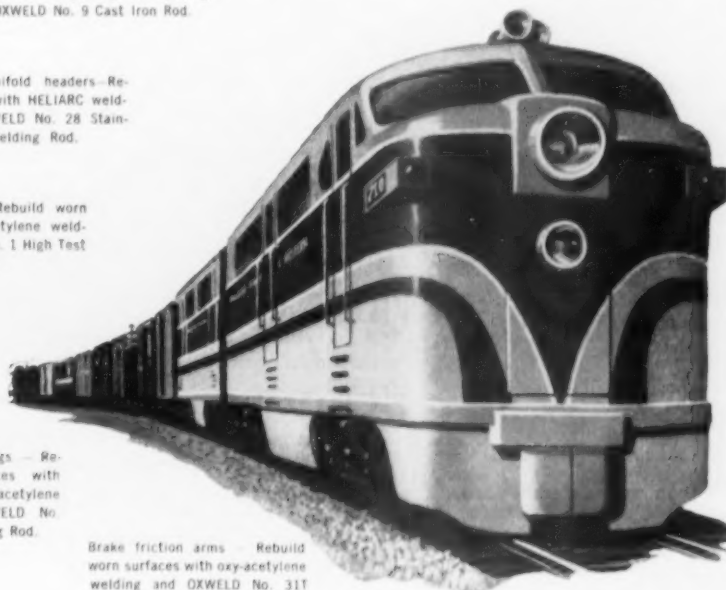
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Questions and Answers

(Continued from page 78)

F151-Q—What takes place in Start position?

A—Handle pulled to right and upward against spring pressure. Starting contactors G+ and G— are energized, connecting the main generator to the batteries to start the engine.

F152-Q—What is the result in Isolate position?

A—Handle upward, engine is said to be "Isolated" or off the line and will remain at idling speed regardless of throttle position. Power contactors P-1 and P-2 cannot close.

F153-Q—How does this affect the power delivered?

A—Power cannot be delivered on the unit, either in motoring or dynamic braking. Other units are not affected.

F154-Q—In this position, will the alternator failure alarm operate?

A—No.

F155-Q—How is the throttle affected?

A—The engineer's throttle in stop position will not shut down on engine which has been isolated.

F156-Q—How are engine stop buttons affected?

A—The engine stop push button on the engine control panel is operative only with the isolater in ISOLATE position. The emergency engine stop button on the engine is operative at any time.

F157-Q—What takes place in RUN position?

A—Handle downward. This places the engine under the engineer's controls or "on the line."

Engine Stop Button

F158-Q—How does the engine stop button stop the engine after it is isolated?

A—By energizing the D solenoid on the governor.

F159-Q—What other condition is required for the button to be operative.

A—The Control Cut-Out breaker on electrical cabinets must be on ON for this button to operate.

Emergency Stop Button

F160-Q—Locate and describe this button.

A—This is a large red push button located on the engine above the governor.

(Bulletin 1706—101-A, page 26)

F161-Q—What is the function of the emergency engine stop button?

A—Its function is to manually trip the engine overspeed safety mechanism to stop the governor in an emergency. Operation of the button is entirely independent of the governor or engine control panel stop push button electrical circuits.

Engine Overspeed Reset Lever

F162-Q—Where is this lever located?

A—On the engine above the governor.

F163-Q—How is the Overspeed Reset Lever manipulated?

A—To reset, pull lever as far as possible in the direction of the arrow until it latches.

F164-Q—What happens if an engine shuts down because of the overspeed tripping?

A—Alarm bells will ring in all units and a blue light will show on the engine control panel of the unit affected.

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G141-Q—In what position must the isolation switch be placed to obtain power from the unit?

A—The switch must be placed firmly in the RUN position to obtain power from the unit.

G142-Q—When should the switch be opened or closed?

A—Only with the engine at idle speed or stopped.

G143-Q—How is the engine brought to idle or stop when the locomotive is under power or in dynamic braking?

A—Use the manual layshaft lever to bring the engine to idle or stop under these conditions.

G144-Q—What precaution should be taken?

A—The isolation switch should not be placed in RUN when other units are in dynamic braking.

Engine Governor

G145-Q—What type of engine governor is used on these locomotives?

A—An electro-hydraulic Woodward P. G. governor.

G146-Q—How does the governor function?

A—The engine speed is controlled by the throttle through the governor.

G147-Q—What feature does the governor include, and when is it used?

A—This governor includes an unloader (ORS), used during transition or when the throttle is in IDLE.

G148-Q—What would cause the governor to stop the engine?

A—Low oil pressure or high vacuum on the suction side of the lube oil pump.

G149-Q—What are the indications for such a condition?

A—The alarm bells will sound in all units of the locomotive; the yellow Low Oil and the blue Alternator Failure signal lights will show in the unit affected.

G150-Q—When the governor safety control stops the engine, what must be done to extinguish the Low Oil alarm light?

A—A push button on the front of the governor housing moves out approximately $\frac{3}{8}$ ", exposing a red band around the shaft of the button. This push button must be pressed in (reset), to extinguish the Low Oil alarm light.

G151-Q—What must be done to extinguish the Alternator Failure alarm light?

A—The isolation switch must be moved to START position.

G152-Q—What must be done to stop alarm bells?

A—Both of the above actions are necessary.

G153-Q—Will the push button trip in any case?

A—No, only if the engine is stopped by oil trouble.

G154-Q—Can the engine be started if the push button is not reset?

(Continued on page 84)

THE ENGINEER'S REPORT

DATA	
LUBRICANT	RPM DeLo Oil R.R.
UNIT	Diesel locomotive
SERVICE	Transcontinental freight- grades to 1.8%
PERIOD	3 years
LOCATION	Minneapolis, Minn., to Wenatchee, Wash.
FIRM	Great Northern Railway

504,851 freight miles in 3 years without overhaul!



ONLY 0.002 INCH WEAR was miked on liners of this locomotive's engines when they were inspected after 504,851 actual miles. Lubricated with RPM DELO Oil R.R., the engines operated without trouble of any kind during 3 years of tough service hauling freight over the Continental Divide. Representative piston and liner, above right, shown as they appeared when taken from one of the engines, demonstrate good condition of parts after this extended service. All rings were free when engine was torn down. Overhaul was performed only because of time and mileage on engine, which was estimated to have idled the equivalent of 100,000 miles in addition to actual mileage. Besides low wear of liners, other wear measurements (inches) were only: Wrist Pin—0.001; Wrist Pin Bushing—0.0015; Carrier Bushings—0.0015; Oil Ring—0.003.

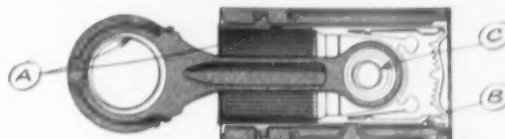
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Questions and Answers

(Continued from page 82)

A—No. Push button must be reset before the engine can be started.

G155-Q—What time delay is provided?

A—When the engine is started and run at idling speed, the governor will stop the engine after approximately forty seconds, if the condition still exists which caused the original shut down.

G156-Q—Why is this time delay provided?

A—To allow a check to determine the cause of shut-down.

G157-Q—What precaution should be taken in this respect?

A—The engine should not be repeatedly started if the governor persists in shutting the engine down.

G158-Q—What action takes place if an attempt is made to run the engine above idling speed during the delay period?

A—The governor will stop the engine at once if the oil pressure is low or the oil pump suction high.

Layshaft Manual Control Lever

G159-Q—How is the layshaft manual control lever connected?

A—The layshaft manual control lever is attached to the end of the injector control shaft at the left front corner of the engine.

G160-Q—What is the function of this lever?

A—This lever may be used to manually shut down the engine or to bring the speed to idle. (As when taking the engine "off the line.")

G161-Q—In what other way can this lever be used?

A—To facilitate the starting of a cold engine.

Engine Overspeed Trip

G162-Q—Where is this device located and what is its function?

A—Located in the front end of the engine, this device will trip and bring the engine to a stop when engine overspeed prevails.

G163-Q—At what speed will this happen?

A—Exceeding approximately 910 rpm.

Schedule 24 RL Air Brakes

1803-Q—What is function of relay T shown on plate 13?

A—This relay serves to disconnect the Wheatstone bridges from the train line circuit when the brakes are applied.

1804-Q—When is this relay energized?

A—This relay is normally energized and is caused to assume the release position when the brakes are applied as will be explained later.

1805-Q—Describe the flow of current to energize relay T.

A—Plate 13 shows that the relay is normally energized by current flowing from the B+ supply through the limiting resistor R24 and through the coil of the relay.

1806-Q—What completes the connection between the Wheatstone bridge and the application magnet wire?

A—When the brakes are released and relay T is energized, its contacts C1-C2 and B1-B2 are closed, completing the connection.

1807-Q—What happens when relay T goes to its release position?

A—Contacts C1-C2 and B1-B2 are opened, thus opening the connection between the bridge and the application train line wire.

1808-Q—Describe these contacts.

A—Contact C1-C2 is a heavy duty contact, while B1-B2 is a low resistance contact.

1809-Q—What is condenser C4 used for?

A—It is used as an arc suppressor.

1810-Q—What other contact is closed when relay T is energized?

A—Contact B3-B4.

1811-Q—What connection does this contact make?

A—Connects B+ to the Wheatstone bridge at resistor R1 and to the W, X and V relays at resistor R13.

1812-Q—What is responsible for removal of battery supply from the bridge and pulsing relays?

A—When the brakes are applied, contact B5-B6 opens, thus removing battery supply to the bridge and pulsing relays.

1813-Q—What is still another contact on relay T, shown on Plate 13, and when is it closed?

A—Contact A5-A6, and it is closed when the brakes are released and the battery supply for relay U is carried through this contact.

1814-Q—How does relay U receive its battery supply?

A—Plate 12 had shown that the battery supply for relay U was carried from contact A6 of relay V and thence to relay U either through contact A1-A2 of switch S or through C4-C5 of relay U.

1815-Q—Why is the battery supply carried through contact A5-A6 of relay T before going to relay U?

A—Under this arrangement it is impossible to energize relay U unless the brakes are released as indicated by relay T being energized.

1816-Q—Why is this feature necessary?

A—Because the proper bridge balance and pulsing of the relays can be obtained only with the brakes released.

1817-Q—Referring back to earlier descriptions, when are the brake circuits checked?

A—By the bridge when brakes are released; by the current when applied.

1818-Q—Why is it necessary to hold relay U energized?

A—Since the indicating lights are controlled from contacts on relay U it is necessary to hold the relay energized while the brakes are applied.

1819-Q—Why is it necessary to provide another source of power to hold relay U energized?

A—Releasing relay T would open the battery supply of relay U, thus allowing it to become deenergized when the brakes are applied, therefore it is necessary to provide another source of power to hold relay U energized when the brakes are applied.

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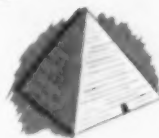
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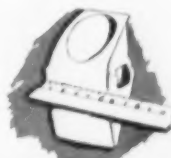
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FACTS ABOUT **Exide**[®]

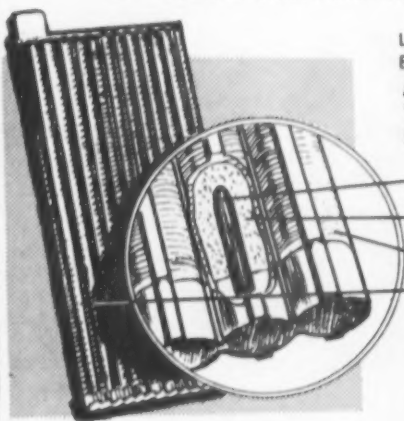
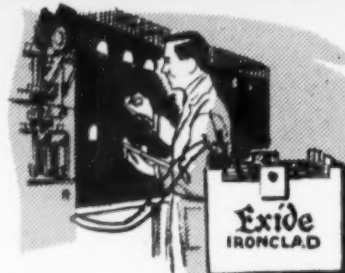
IRONCLAD[®] DIESEL STARTING BATTERIES

FINGER TIP CONTROL OF 2000 HORSES WITH EXIDE-IRONCLADS

THEY SPIN 2000 H.P. DIESEL LOCOMOTIVE UNITS TO FIRING SPEED IN SECONDS. THE TREMENDOUS RESERVE POWER OF EXIDE IRONCLADS ASSURES NOT ONLY QUICK STARTING BUT ALSO THE POSITIVE OPERATION OF CONTROLS. IRONCLADS GIVE THE BEST BATTERY OPERATION WITH LOWEST COSTS BECAUSE OF EASY MAINTENANCE AND LONG SERVICE LIFE.

BATTERIES ARE **WORKED** TO DEATH BY EXIDE ENGINEERS TO LEARN **SECRETS** OF LONGER LIFE

SINCE 1910, RESEARCHERS HAVE GREATLY IMPROVED EXIDE-IRONCLAD PERFORMANCE AND USEFUL WORKING LIFE, BUT THE BASIC IRONCLAD PRINCIPLE OF TUBULAR CONSTRUCTION REMAINS THE SAME.



LAB TESTS OF IRONCLADS AGAINST CONVENTIONAL TYPES OF BATTERIES SHOW THAT THEY GIVE BETTER PERFORMANCE... AND FROM 20% TO 30% LONGER LIFE! THESE TWO FACTS, DEMONSTRATED BY THOUSANDS OF BATTERY USERS, ARE THE REASON WHY...

PROTECTED CONDUCTING GRID
COMPRESSED ACTIVE MATERIAL
SLOTTED RETAINER TUBE
IRONCLAD POSITIVE PLATE

EXIDE-IRONCLADS
ARE YOUR BEST POWER BUY
AT ANY PRICE!

LET EXIDE HELP SOLVE YOUR DIESEL STARTING BATTERY PROBLEM ① CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ② WRITE FOR FORM 4843 - ALL ABOUT MAINTAINING AND INSTALLING DIESEL STARTING BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

Slugger "Pinch-hits" for Battering Ram...

SAVES \$13,000...

Six men spent 21 hours removing nuts from 54 five-inch diameter bolts on this hydro-generator rebuilding job. An 800 lb. battering ram was used to remove the nuts, which held three drive shaft couplings together between water wheel and generator.

It took seven men another 24 hours to tighten the same nuts with the battering ram. Down time on the generator cost \$300 per hour. The problem was how to run the nuts faster and with less manpower.

AIR engineering was put to work. A Size 588 Slugger Impactool "pinch-hit" for the battering ram. Two men then removed all the nuts in 1¾ hours, and put them on again in 2 hours, saving 286½ manhours and 41¼ hours down time. With nearly \$13,000 saved on its first job, the Slugger now has a "full-time" job.

If you in any way influence production or maintenance cost-savings in your plant, it will pay you to see I-R's confidential manual of reports on "AIR engineering at work". Write on your company letterhead, and we'll make arrangements for you to see it soon.

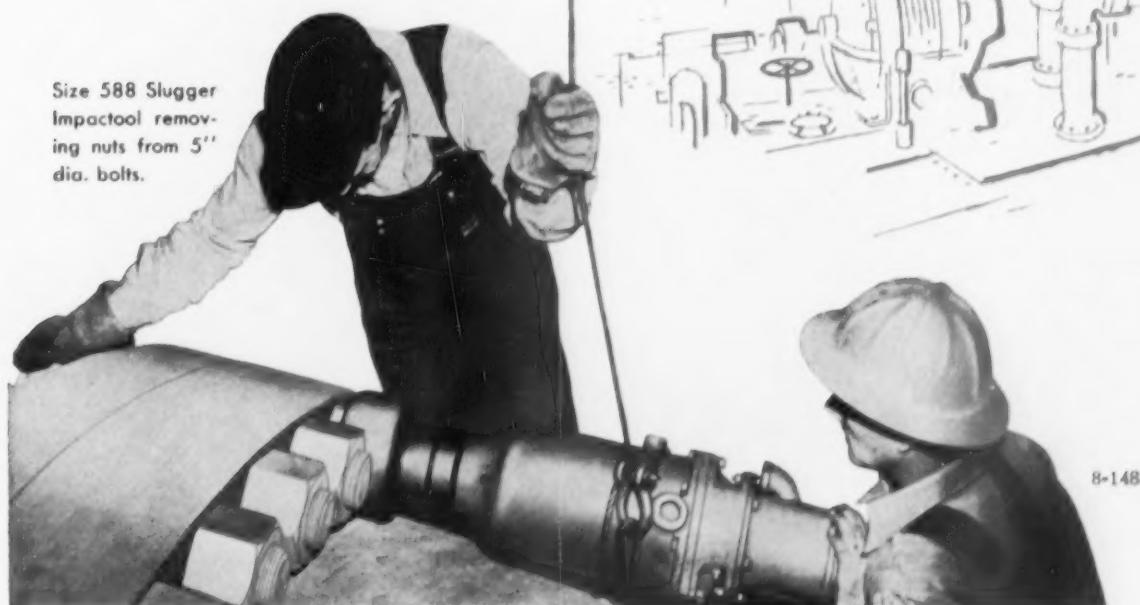


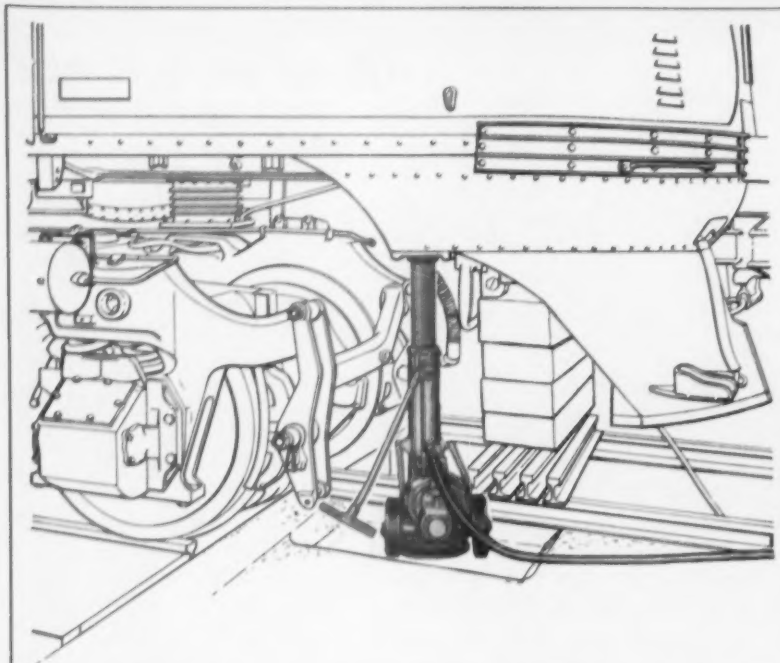
AIR engineering Manual

Over 100 interesting and helpful case history applications of AIR engineering at work.

Ingersoll-Rand
11 Broadway, New York 4, N. Y.

Size 588 Slugger Impactool removing nuts from 5" dia. bolts.





How One Man Can Raise the Heaviest Diesel Locomotive in a Few Minutes!

Take two Duff-Norton Air Motor Power Jacks, wheel them into position under the locomotive frame, connect them with an air hose "Y," turn the valve that starts compressed air into the jacks' built-in air motors, then sit down if you wish and watch as the load goes up evenly, smoothly, safely—in a few minutes you can proceed with repairs. Locomotive trucks, for example, can be completely replaced in about 2 hours!

Tests conducted by various railroads in their own shops have shown savings in time and labor that pay for these air motor jacks in a few months.

Get the complete specifications of the various time and labor-saving Duff-Norton Air Motor Power Jacks. They vary in capacity from 20 to 100 tons. Write the world's oldest and largest manufacturer of lifting jacks for catalog AD-11G, The Duff-Norton Manufacturing Company, P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON

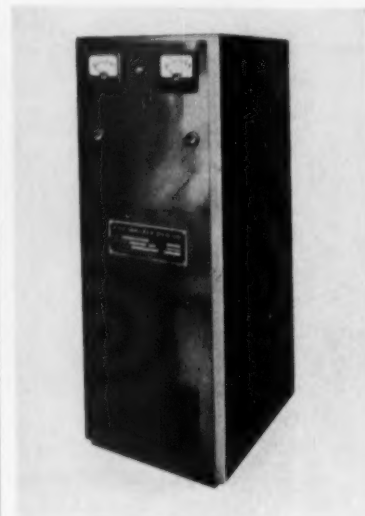
"Giving Industry A Lift Since 1883"

Jacks

EQUIPMENT

(Continued from page 16)

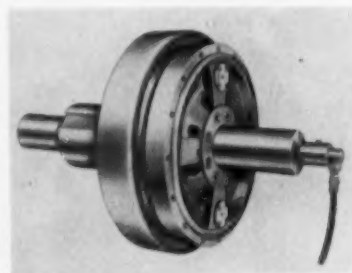
the extinguisher shell and a practical and functional carrying handle. The unit has the approval of the National Board of Fire Underwriters. Ansul Chemical Company, Marinette, Wis.



Selenium Rectifiers

Highly efficient, according to the manufacturer, these rectifiers have a power factor of 97 per cent and a d-c ripple of approximately 4 per cent. They are available in many models for industrial application including fan cooled, convection cooled, combination convection-fan cooled and water-cooled types.

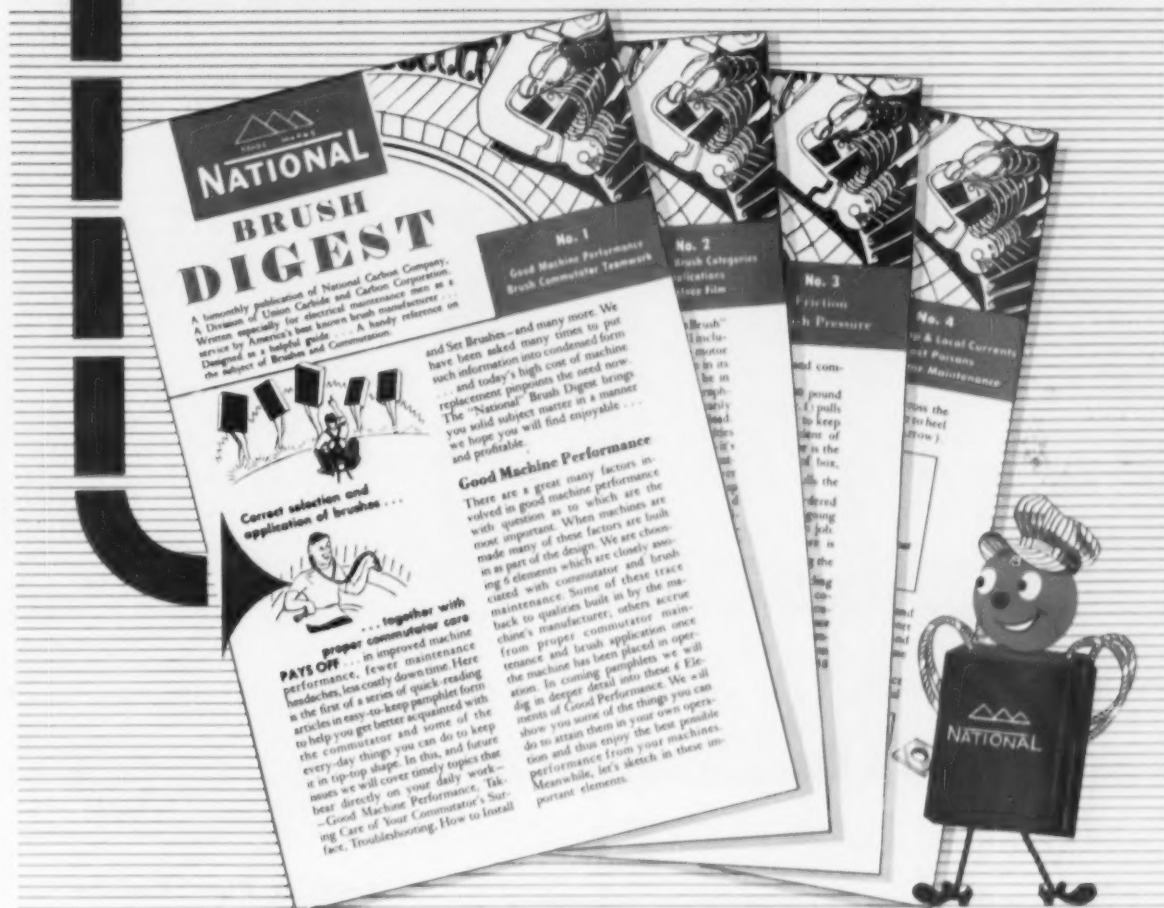
These rectifiers have been designed to give many years of service and inexpensive operation, states the manufacturer. Over-size components are used throughout. Copper bus bars operate at low current density. The Walker Division, Norma Hoffman Bearings Corporation, Stamford, Conn.



Air Clutch Indicating Micrometer

This device, the Air-Grip, responds instantly to a touch of the throttle because a minimum of air is used in operation. This

ORDER THIS **FREE** TWO-YEAR COURSE IN MOTOR AND GENERATOR MAINTENANCE



HERE'S AN INSTALLMENT COURSE in brush and commutator maintenance *especially edited for the operating man* — and it's yours with the compliments of National Carbon Company.

If you are a supervisor, write for these interesting, fully illustrated pamphlets in *quantity* . . . distribute them to electrical and mechanical departments, purchasing agents, employee training classes. Issued every other month, these four-page, pocket-size

folders offer light, easy reading, yet are packed with fundamentals of commutator care and maintenance, brush selection and application, and simplified theory.

FILL IN THE BLANKS BELOW AND MAIL.

You'll get each issue thereafter in the quantity requested, including any back issues prior to your request. Treat yourself and your men to this useful "course", based on National Carbon's 70-year experience in the field.

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trademarks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd St., New York 17, N. Y.

Sales Offices: Atlanta, Chicago, Dallas,
Kansas City, Los Angeles, New York,
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Union Carbide Canada Limited, Toronto

NATIONAL CARBON COMPANY
30 East 42nd Street — Room 1328 — New York 17, N. Y.

Gentlemen: Send me . . . copies of each installment of your **BRUSH DIGEST**, including any installments issued prior to this request.

I understand that this offer is made by your company as an industrial service and in no way obligates me or my company to National Carbon Company or to the use of its products. I am to receive the above series of pamphlets free of any charge.

NAME TITLE

COMPANY

ADDRESS

Signed

sensitivity provides a finger-tip control and an ability to inch the clutch or throw it into full engagement, as required. Instant disengagement is achieved by the use of quick release valves built into the unit itself. These valves are optional equipment when fast disengagement is desired. Provision has been made for internal ventilation. The internal flexible air seal disc is so located that it does not come in contact with the heat generating plates.

Provision is also made for mechanical engagement of the clutch in case the air supply fails. It is available in single and double plate models from 8.5 to 806 hp at 100 rpm at 80 psi. Dodge Manufacturing Corporation, Mishawaka, Ind.



Temperature Controller

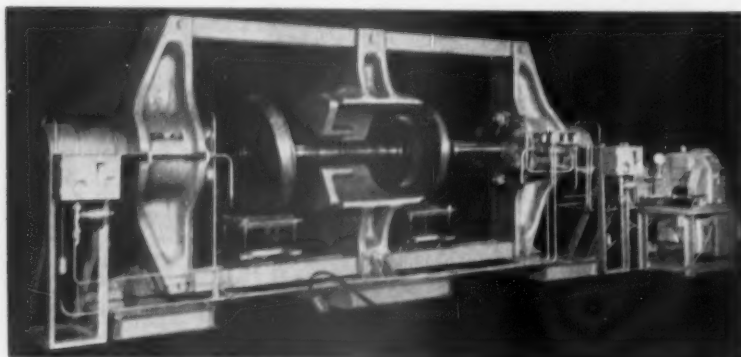
This control has been designed to provide cooling systems for diesel-electric loco-

tives with closer temperature regulation and greater system stability, according to the manufacturer.

The control, which is for use with clutch-driven fans, will operate in temperatures ranging from minus 40 to 120 deg F and is unaffected by sleet, freezing rain, drifting snow, sand, cinders or brakeshoe dust. It will operate at altitudes over 10,000 ft as well as in tunnels.

The device is basically a single lever moved by a thermostat. This lever operates a multi-finger rheostat in series with a clutch coil and voltage supply. Shutter air cylinders are supplied from a common air line controlled by a conventional magnet. Excitation for this valve is supplied from a tap on the clutch rheostat.

Maximum response is possible because the controller is closely tied-in with the water system. The controller eliminates fragile thermostat leads and prevents difficulties caused by low ambient temperatures. Locomotive and Car Equipment Department, General Electric Company, 1 River Road, Schenectady 5, N. Y.



... mount or dismount car wheels easily with a Rodgers Double End Car Wheel Press

MOUNTING or dismounting car wheels without reversing the axle in the press is just one time and labor saving feature of the Rodgers 600 Ton Double End Press illustrated above. This press permits individual or simultaneous mounting of two wheels, removes wheels from axles equipped with drive gears, etc.

Rodgers Hydraulic Equipment Includes
Double End Car Wheel Press, 600 and 400 ton capacities.
Single End Car Wheel Press in three capacities:

- 200 ton, 10" diameter yoke
- 300 ton, 14" diameter yoke
- 400 & 600 ton, 18" diameter yoke

Hydraulic Pumps: 2 and 4 cylinder
Forcing Presses: vertical, inclined, horizontal and portable.
Pinion Pullers

Write for illustrated catalog 315A



Rodgers Hydraulic Inc. 7464 Walker Street
Minneapolis 16, Minn.



Portable Pipe Machine

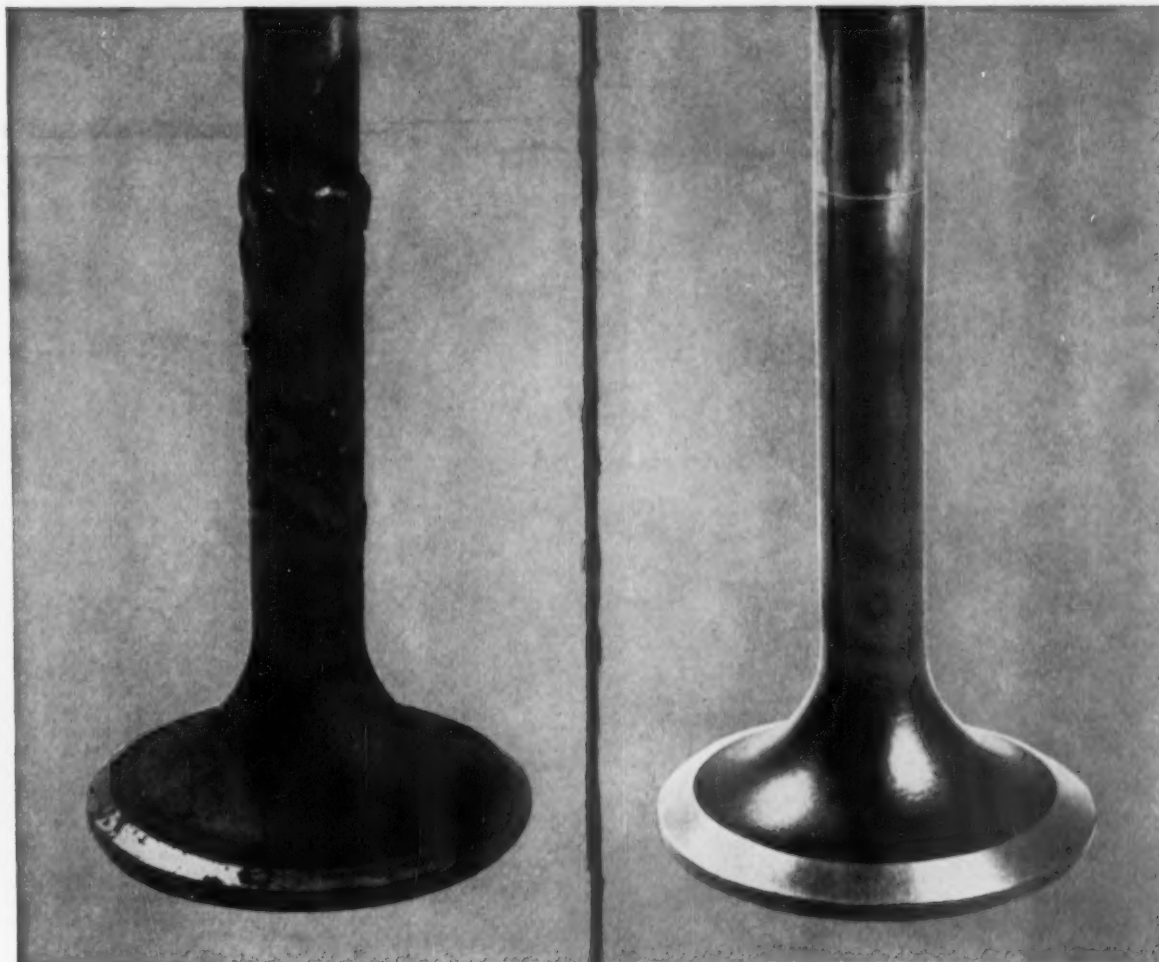
The No. 552 Pipe Master as this machine is called will ream, thread, and cut-off all sizes of pipe from 1/4 in. to 2 in. It will also drive geared die-stocks and cutters up to 12 in. through a special drive shaft.

This portable pipe and bolt threading machine weighs only 265 lb, is 39-1/2 in. long, 17-1/2 in. wide and 17-1/4 in. high. It has a 1/2 hp universal, geared-head variable speed motor. Spindle speeds are automatically variable with load—22 to 36. The device is equipped with a floating type adjustable die-head and an adjustable front chuck. Oster Manufacturing Company, 2057 East 61 Place, Cleveland 3.

Electrical Filler Tape

This formulation, No 125 electrical filler tape, is an insulating compound in the form of a thick tape, wound together with a fabric-separating strip to form a roll. It is intended to replace bulk insulating fillers which require troweling, and to speed splicing operations.

Areas to be built up can be thumb-mold-



BEFORE IMMERSION IN PENNSALT MULTI-METAL CLEANER these valves are heavily coated with burnt carbon and baked on fuel deposits.

AFTER 1 HOUR IN PENNSALT MULTI-METAL CLEANER the valves are sparkling clean, ready for regrounding and reassembly.

Unretouched photographs show amazing cleaning ability of PENNSALT MULTI-METAL CLEANER

These valves are typical of thousands of vital diesel parts cleaned with Pennsalt Multi-Metal Cleaner by a leading American railroad. In this same shop tank go aluminum pistons, heads and liners; steel valves, and other precision items. Every part comes out clean, needing only a short rinse before inspection and rework.

Pennsalt Multi-Metal Cleaner cuts costs, simplifies shop procedures because one cleaner does a complete

job on *both* ferrous and non-ferrous parts. It cleans without attacking the base metal—will not etch even polished aluminum surfaces. It dries clean, never streaks. And it doesn't produce disagreeable fumes.

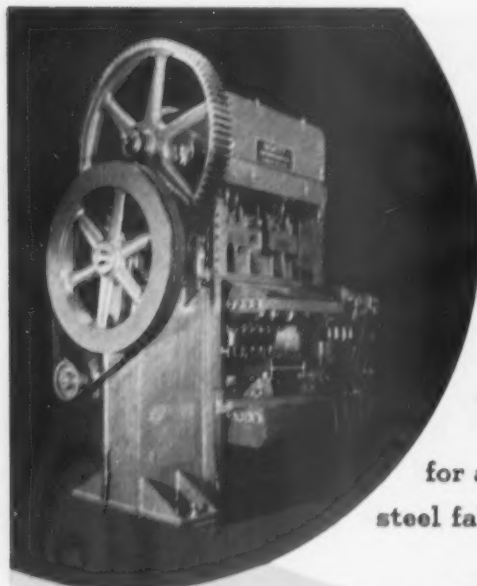
You can get more hard facts about Pennsalt Multi-Metal Cleaner from your Pennsalt Railway Maintenance Specialist. Call him now—or write us for specific information. Pennsylvania Salt Mfg. Co., Railroad Maintenance Dept., EAST;

1037 Widener Bldg., Philadelphia 7, Pa. WEST: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Favorite of the men in the shops

Pennsalt Multi-Metal Cleaner is a Trade Mark of Pennsylvania Salt Mfg. Co.



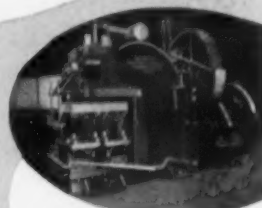
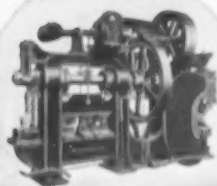


This Beatty Punch CUT COSTS 75%

for a structural
steel fabricator

One of our present-day satisfied customers formerly employed machinery using only one punch for punching structural steel shapes. After consulting a BEATTY engineer, this firm installed a BEATTY Guillotine Beam Punch with an adjustable tooling feature that enables them to perform exact repeats of multiple punch patterns in 25% of the time formerly required. Naturally, we can't guarantee such substantial savings in every industrial installation of BEATTY machines! But, if you're currently considering additional production machinery for your metal fabricating plant, better see a BEATTY engineer before making any final decisions! Chances are he'll have an idea or two on how you can achieve greater production economies with BEATTY Machines!

BEATTY
Co-Pun-Shear does
coping, punching and
shearing without chang-
ing tools.



BEATTY Heavy Duty Punch
handles steel up to 65 ft.
long. Punches webs, and
flanges.



BEATTY Spacing Table handles
beams, channels and
plates with speed and
precision.



**BEATTY Press Brake and
Flanger** for any type of
bending, forming, flang-
ing, pressing.

BEATTY
Machine & Mfg. Company
HAMMOND, INDIANA

ed to shape, and thicknesses pressed on at low spots with pieces torn from the roll. This tape fuses to a homogeneous mass in seconds. It is also practical for covering sharp-cornered electrical connections and for padding the edges of bus bars. It is not intended for sole insulation; the manufacturer recommends finishing with a sealer of polyethylene or vinyl tape. *Bishop Manufacturing Company, 138 Factory street, Cedar Grove, N.J.*

SUPPLY TRADE NOTES

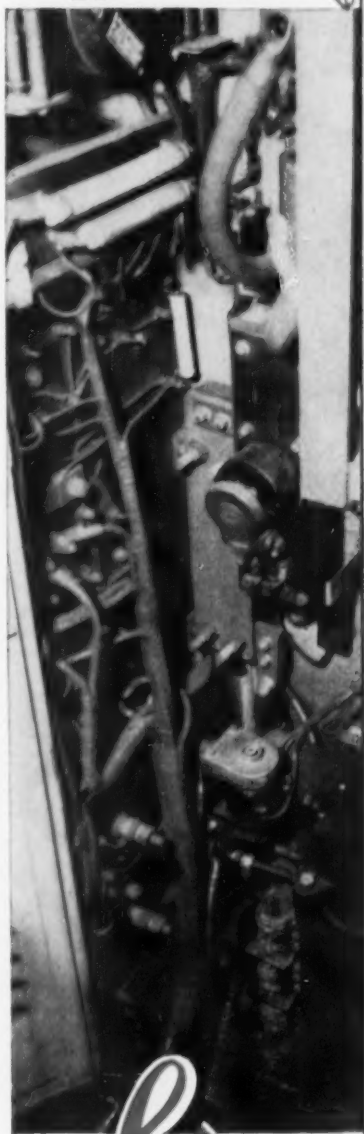
RAILROAD FRICTION PRODUCTS CORPORATION.—The *Westinghouse Air Brake Company* and the *Johns-Manville Corporation* have formed the *Railroad Friction Products Corporation* to produce and market the *Cobra* brake shoe for locomotives and car equipment, which is being developed jointly by the two companies. The officers of the new company, which is located in Wilmerding, Pa., are *William C. Landis*, president, and *Raymond P. Townsend*, vice-president. Mr. Landis continues also as vice-president and general manager of the *Air Brake Division* of the *Westinghouse company*, and Mr. Townsend, as vice-president of the *Johns-Manville Sales Corporation* and manager of the *Transportation Industry Department*. Initially, *Johns-Manville* will be responsible for the commercial production of the *Cobra* brake shoe, while *Westinghouse Air Brake* will merchandise and sell the product. Further development work will be carried on by the research organizations of the two companies.



J. G. Mitchell

CANADIAN CAR & FOUNDRY CO.—*J. G. Mitchell*, chief engineer and production manager, Car division, has been appointed vice-president, manufacturing, railway car equipment. *G. L. McMillin* has been appointed assistant vice-president, steel foundry. Mr. McMillin was formerly works manager of *General Steel Castings Corporation*.

(Continued on page 95)



COST.....

IS A POOR YARDSTICK TO JUDGE QUALITY

Diesel locomotive wire should be as dependable and long-lived as money can buy. If it fails under grueling service conditions, the locomotive stands still. That's why quality of diesel locomotive wire should be the determining yardstick, not cost.

Simplex makes two types of diesel locomotive wire. Type A, for conduit and interior wiring, is designed to save space. Type B has a reinforced jacket for exposed locations requiring a heavier, tougher cable.

Simplex Diesel Locomotive Wire retains its physical and electrical properties even in the presence of water and extreme heat. Its jacket has unusual resistance to abrasion, acids, flame, oil, sunlight, and tear *even under extreme heat.*

Make sure your diesel locomotive wire has the quality that can take it by specifying Simplex Diesel Locomotive Wire. To find out more about this wire, send to the address below for Bulletin No. 1016, or contact your nearest Simplex representative.

Simplex

DIESEL LOCOMOTIVE WIRE

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Massachusetts



NATIONAL OIL SEALS help
keep the roll in roller freight

National Oil Seals are vital to the smooth, trouble-free operation railroads enjoy with roller bearing journal boxes. Mounted inside the journal box, these precision seals keep lubricant in—dirt, dust and water out. Uniform sealing is assured under all conditions, even winter blizzards, desert sand storms or immersion of the journal in water.

Like roller bearing journal assemblies themselves, National Oil Seals are rolling in over 85,000 freight car

journal boxes; rolling millions of miles without malfunction or replacement. They are playing an important role in the success of roller bearing railway journals—and the elimination of costly hot boxes.

NATIONAL MOTOR BEARING CO., INC.

General Offices: Redwood City, California. Sales Offices: Chicago, Cleveland, Dallas, Detroit, Downey (Los Angeles County), Milwaukee, Newark, Van Wert, Wichita. Plants: Redwood City, Downey and Long Beach, California; Van Wert, Ohio.



Original equipment on cars, trucks, buses, tractors, railway rolling stock, machinery and appliances.

3136

SUPPLY TRADE NOTES

(Continued from page 92)



Dr. F. E. Lowance

WESTINGHOUSE AIR BRAKE COMPANY.—Dr. Franklin E. Lowance has been appointed director of research and engineering. In this newly created position Dr. Lowance will direct and coordinate the research and engineering activities of all subsidiaries and divisions of Westinghouse Air Brake.

Dr. Lowance received his Ph.D. degree in 1935 from Duke University where his academic work was in physics and mathematics. His full-time work in research and development has been in the physics and engineering departments of Centenary College in Louisiana, Georgia Institute of Technology, and Georgia Institute where electronic and electro-mechanical projects were also under study. During World War II he served in civilian research and development work and in August 1953 was appointed associate technical director at the U.S. Naval Ordnance Test Station at China Lake, Cal.



E. W. Butler

SPEER CARBON COMPANY.—Edward W. Butler has been appointed vice-president in charge of sales. Mr. Butler was formerly vice-president of the International Telephone & Telegraph Co.

WATSON-STILLMAN Socket-Welding Air Brake Flanges



Simplified installation and strong, tough connections are assured with Watson-Stillman Socket-Welding Air Brake Flanges. Machined from tough steel forgings, these 2-bolt oval flanges are now available in two designs—each interchangeable with other air brake flanges. The W-S One-Piece flange, now standard equipment on many railroad cars, provides a strong, leak-proof joint with maximum resistance to shock and vibration.

The recently developed 2-piece Swivel-Joint Flange was designed to facilitate bolt-hole alignment. The flange can be rotated on the insert to any position until bolt holes line up. The Swivel-Joint flange permits most of the piping to be fabricated in the shop.

Sold Through Leading Distributors

For detailed technical information on Watson-Stillman Air Brake Flanges and other Railroad Pipe Fittings send Today for Bulletin RR-1.



WATSON-STILLMAN FITTINGS DIVISION



H. K. PORTER COMPANY, INC.

Roselle, New Jersey

R.2

Manufacturers Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on coupon below to receive information desired; requests will be handled direct by manufacturers.

1. WIRE ROPE SLINGS. *MacWhyte Co.* 100-page 2-color plastic-bound catalog (S-8) describes, illustrates and gives specifications for the MacWhyte line of wire rope slings and fittings; 19-page photo section shows variety of slings made and their many uses.

2. SPRAY PAINTING. *The DeVilbiss Co.* 68-page booklet (F-278) "The ABC's of Spray Equipment", in question and answer format, in non-technical language and illustrated with drawings, gives a clearer picture of spray painting.

3. VALVE & FITTINGS. *The Lunkenheimer Co.* Comprehensive, illustrated, 4-page circular (601) describes, illustrates and gives dimensions for Luncor, the first all molded PVC valve and fittings.

4. BRAZING ALLOYS. *Air Reduction Sales Co.* Aircosil Brazing Booklet gives complete information on the new and complete line of Aircosil silver brazing alloys and flux. (Aircosil brazing alloy only type sold by avoirdupois weight—16 ounces per pound.)

5. WRITE-ON TAPE. *Labelon Tape Co., Inc.* 4-color folder (#5) describes Labelon pressure sensitive plastic tape "you can write on"; pictures and description show many uses; sample of the tape is included.

6. OVERHEAD CRANE. *Whiting Corp.* 8-page technical bulletin (Unit 79) "How To Select An Overhead Traveling Crane" is designed to help analyze handling problems, decide on type of crane desired, and draw up specification sheets for crane proposals; includes the 14 minimum crane safety features.

7. RUBBER ELECTRICAL PROPERTIES. *E. I. du Pont de Nemours & Co.* Neoprene Notebook 61 (8th in Language of Rubber series) "Electrical Properties of Rubber" includes a discussion of a new locomotive jumper featuring remountable neoprene head.

8. NICKEL CAST IRON. *International Nickel Co.* 28-page basic reference bulletin (A-69) "Guide To The Selection of Engineering Irons" presents many characteristics of modern nickel alloyed cast irons. 50 photos show typical applications; includes 27 tables and charts.

9. SPRAY WELDING. *Wall Colmonoy Corp.* 4-page 2-color illustrated bulletin (300) describes the new Model C

Spraywelder (a metal powder spraying unit used in welded overlay type hard-facing applications) and the Sprayweld process.

10. GRINDING WHEELS. *Carborundum Co.* 4-page brochure (A1310) "V40 For Tool Room Grinding" describes complete new line of tool room wheels and lists hints for tool conservation; includes colorful stiff tool room chart with recommendations for grinding high speed tool and die steels.

11. BREATHER FILTERS. *Air-Maze Corp.* New folder illustrates and describes the complete line of Breather Filters both "oil-wetted" and "oil bath" types, contains over 24 engineering drawings and photographs, includes design and operating advantages.

12. PARTICLE TESTER. *North American Philips Co., Inc.* 8-page booklet (RC-135) "Norelco Portaflux—New Portable Magnetic Particle Test Unit" describes the Portaflux method for checking ferrous metal objects for surface discontinuities, with photos, drawings and diagrams describes principle of magnetic particle testing.

13. TACHOMETERS. *Metron Instrument Co.* Metron Case History Mailer #3 describes and illustrates the Metron 3-in-1 hand tachometer at work, gives reasons for product selection.

14. FLEXIBLE COUPLINGS. *Ajax Flexible Coupling Co., Inc.* Pocket size selection guide (1054) contains technical data—ratings, drawings, specifications, service factors—plus data on uses of AJAX Rubber-Bronze Bushed Flexible Couplings.

15. LUBRICATION. *Alpha Corp.* 4-page 2-color folder (103) "Fringe Area Lubrication With Molykote Lubricants" lists the various types of Molykote Molybdenum disulfide lubricant, the temperature range and application methods for each.

16. WRENCHLESS CHUCK. *Beaver Pipe Tools, Inc.* 6-page fanfold self-mailer (PG-12-54) announces, pictures and describes the new Power Grip Wrenchless Chuck, how it adapts to old machines, how Power Grip Rocker Jaws give solid grip.

17. SPUR GEAR HOIST. *Coffing Hoist Co.* 8-page 2-color bulletin (YC-YCT) describes the line of Coffing spur-gear hoists, includes photos, cut-away drawings, descriptions and specifications of the 62 different sizes and models.



H. H. Helmbright

GENERAL ELECTRIC COMPANY. — *Henry H. Helmbright*, for many years head of the Railroad Lighting Section of the Application Engineering Department of General Electric's Lamp Division, at Nela Park, Cleveland, O., retired December 31.

Mr. Helmbright joined GE in 1919 after graduation from Case Institute of Technology. He has been involved in railway lighting since 1921, and played an important part in the introduction of sealed beam type headlighting and fluorescent lighting to the railroads. During World War II he worked on railroad blackout lighting. Mr. Helmbright is a member of the New York Railroad Club, the American Transit Association, Illuminating Engineering Society, and International Illumination Commission.



N. D. Bailey

EX-CELL-O CORPORATION — *Niley D. Bailey* has been appointed manager of railroad sales. Mr. Bailey, who joined Ex-Cell-O in 1941, was assigned special sales work in the Railroad Division from 1944 to 1949 when he was appointed to the home office staff of the division.

DUFF - NORTON MANUFACTURING COMPANY — *John J. Dixon* has succeeded *Frank H. Schwerin* as chief engineer. Mr. Dixon joined Duff-Norton in 1943 after serving in the engineering department of the Edwin L. Wiegand Company. Mr. Schwerin has retired after 36 years with Duff-Norton.

Reader Service Department
Railway Locomotives and Cars
30 Church St., New York 7, N. Y.

FEBRUARY, 1955

Please send literature circled below:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17			

Also, please send me additional product information as follows: (company, product & page number)

Name _____ Title or Position _____

Company _____

Address _____

City _____

Zone _____

State _____



L. T. Duffy

UNION SPRING & MANUFACTURING CO.—*Leo T. Duffy* has been appointed manager of railway sales in the Chicago district, with headquarters in the Fisher building, 343 S. Dearborn street.

Mr. Duffy was previously the head of the Railway Repair & Supply Co. Prior to this he was president of Apex Railway Products for three years and vice-president of Youngstown Steel Door Company for fifteen years.

WORTHINGTON CORPORATION — *William A. Meiter*, central sales manager, has been appointed general sales manager, succeeding *Thomas J. Kehane* who is now vice-president in charge of sales.

AJAX CONSOLIDATED COMPANY *Nicholas H. Arnold* has been elected president. Mr. Arnold was formerly sales manager of the Standard Railway Equipment Manufacturing Company.

Ajax Consolidated has taken over the manufacture and sales of the products of *Henry Giessel Company*, Chicago, which company is being liquidated.

JOY MANUFACTURING COMPANY — *R. G. Gehlsen* has been appointed manager, electrical connector products, with headquarters at 1201 Macklind avenue, St. Louis. *H. B. Zeppenfeld* has been appointed sales manager, Electrical Connector Division, with headquarters at St. Louis.

AMERICAN BRAKE SHOE COMPANY, BRAKE SHOE & CASTINGS DIVISION — *S. Whitney Dickney*, eastern district sales manager in New York, has been named assistant vice-president, with headquarters in New York.

INTERNATIONAL NICKEL COMPANY. — *James B. Morey* has been placed in charge of the Cincinnati, Ohio, Technical Field Section of the Development and Research Division. *William S. Mounce* has become a member of the Constructional Alloy Steel Section of the division's staff in New York.

AMERICAN HOIST & DERRICK CO.— *William Niessen* and *Kenneth F. Potter* have been appointed to the positions of assistant chief engineer.

ONE Cleaner does it!

Water Rinsing ▼

Lix Cleaning ▼



Clean everything from the exhaust stack to the trucks with "LIX Engine Room Wash"!!

All except the electrical equipment can be safely and easily cleaned faster and more thoroughly than by previous methods. Records show railroads using Lix Engine Room Cleaner do complete cleaning job from stack to trucks in 3 man hours. Even the floors, engine pits and other equipment can be cleaned with "Lix Engine Room Wash."

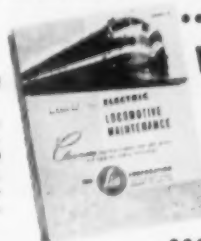
Spray on the "Cleaner" and rinse it off with cold water, solvent or Lix Electric Equipment Cleaner. It's that simple. Removes all "Crater compound deposits from exterior surfaces without brushing or rubbing."

Lix Engine Room Cleaner is safe to use. It is non-toxic and free from fumes . . . will not harm the skin.

TEST IT . . .

in your Shop

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IN ONE YEAR'S TIME!

TWENTY-TWO RAILROADS have made the switch to Air-Maze oil bath filters on the air intakes of hundreds of diesels for freight, passenger or switching service. And reports indicate that savings from Air-Maze filters equal their cost in only one year!

These savings were made possible because Air-Maze oil bath air filters reduce diesel engine wear, servicing costs and turbo-charger maintenance.

Oil bath filters cut engine overhaul costs by scrubbing intake air clean in a bath of oil. Abrasive dust and dirt can't get through to wear out rings, ring grooves, and liners.

Some day all diesel locomotives will have oil bath filtration. Over 98% of all internal combustion engines in use today are protected by oil bath filters. It is a time tested and proved way of reducing maintenance costs. It is effective at all engine speeds. It is not affected by humidity or oil mist conditions. And it does not depend upon high velocity and, consequently, high pressure loss conditions for effectiveness. It reduces servicing to a few times per year.

Air-Maze oil bath filters are now available for the locomotives listed below. For further information on how they can help cut your diesel locomotive filtering costs, call on us or see your locomotive builder.



AIR-MAZE OIL BATH FILTER MODELS AVAILABLE FOR THESE LOCOMOTIVES

MFR.	HP	SERVICE	MFR.	HP	SERVICE
Electromotive	800-900	Switcher	Alco-GE	2250	Rd. Switch
Electromotive	600	Switcher	Alco-GE	2250	Rd. Pass.
Electromotive	1000	Switcher	GE-Cooper Bess.	600	Switcher
Electromotive	1200	Switcher	B-L-H	800	Switcher
Electromotive	2000	Rd. Pass.	B-L-H	1000	Switcher
Electromotive	2250-2400	Rd. Pass.	B-L-H	1200	Switcher
Electromotive	1350	Rd. Freight	B-L-H	1500-1600	Rd. Switch
Electromotive	1500-1750	Rd. Freight	B-L-H	1500-1600	Rd. Freight
Electromotive	1500-1750	Rd. Switch	F-M	1000-1200	Switcher
Alco-GE	900	Switcher	F-M	1500-1600	Rd. Switch
Alco-GE	1000	Switcher	F-M	2000	Transfer
Alco-GE	1500-1600	Rd. Switch	F-M	2400	Trainmaster
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C. F. Norberg

ELECTRIC STORAGE BATTERY COMPANY.—*Carl F. Norberg* has been elected president, succeeding *S. Wyman Rolph*, who has retired after 38 years service.

Mr. Norberg joined Willard Storage Battery Company, then a subsidiary of the Electric Storage Battery Company, in 1925, shortly after he came to the United States from Sweden, where he graduated from University of Upsala and the School of Mines, Royal Institute of Technology. He held a succession of positions and was works manager and chief engineer of Willard Storage Battery Company of California until 1938 when he was transferred to the executive department of Willard in Cleveland. In 1941 he became vice-president in charge of manufacturing. He was transferred to Electric Storage Battery in 1943 and the next year became vice-president in charge of manufacturing. He was elected a director of the parent company in 1948, and in 1950 was named executive vice-president, the position he held until his election as president.

■ **PRECO, INC.**—Preco has acquired *Electra Motors, Inc.*, and *California Gear Company*, both of Anaheim, Cal., as another step in its expansion program. Several months ago it also acquired ownership of *Electrical Products, Inc.*, Los Angeles, manufacturers of capacitors and filters for the electronic industry.

■ **K S M PRODUCTS, INC.**—*Claude Batuck*, district engineer, Stud Welding Division, has been transferred from the Detroit area to Chicago territory. *Donald C. Rolling*, district engineer in the Milwaukee territory, has been transferred to the Detroit area. *F. Kern*, formerly of Denver, has been assigned the West Coast District, administering stud welding sales in California through District Steel, Inc.

■ **KOPPERS COMPANY** — *Frank H. Fischer*, vice-president of the Wood Preserving division of Koppers, in charge of the eastern region, has been given responsibility for special sales activities throughout the country. *Paul Wayman*, assistant manager, eastern region, has been appointed acting manager. *Douglas Grymes, Jr.*, sales manager for the division, has been promoted to executive assistant to general manager and will continue also as sales manager.

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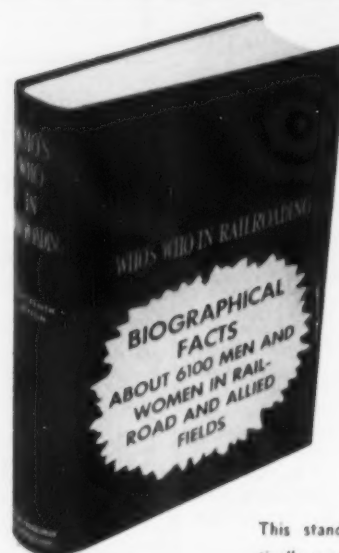
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C. E. Impey

VAPOR HEATING CORPORATION.—*Charles E. Impey*, has been appointed executive engineer. Mr. Impey has been with Vapor for 12 years, along with three years in the Navy as a radar officer. Before coming with Vapor he was with Illinois Malleable Iron, and Majonnier Brothers in Chicago, after attending Beloit College in Wisconsin.

AIR REDUCTION SALES COMPANY.—*L. O. Geiger*, manager of the Dayton, Ohio, district, has retired. Mr. Geiger was with Air Reduction 38 years and supervised the sales activities in the Dayton area since 1927 when he was appointed to the post of district manager. *C. R. Grange*, assistant district manager, succeeds Mr. Geiger.

Mr. Grange became a salesman for the company in 1934 and in succeeding years was located in the Jersey City, N. J., and Philadelphia, Pa., district offices. After serving in the Navy from 1942 to 1945, he returned to Air Reduction as assistant sales manager in the St. Louis district. He has been in the Dayton district since June 1954.

ELASTIC STOP NUT CORPORATION OF AMERICA.—*E. F. Nason*, formerly general sales manager, has been named administrative assistant; *D. E. Lally*, formerly assistant general sales manager, has been made general sales manager, and *Donald B. Sorenson*, formerly Manager of Rollpin sales, has been appointed assistant general sales manager.

FORMICA COMPANY.—Formica has appointed the *Met-L-Wood Corporation*, Chicago, as manufacturing and sales representative to the transportation industry.

LAMSON & SESSIONS CO.—*James G. Rayburn*, assistant general sales manager, has succeeded *Robert G. Patterson* as general sales manager. Mr. Patterson continues as vice-president.

KERITE COMPANY.—*William A. Edwards* has been appointed assistant to vice-president *A. H. Smith*. Mr. Edwards, who joined Kerite as a Railroad department sales representative in 1946, was associated with power and light construction companies before World War II service as an 8th Air Force lieutenant (pilot).

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In railroad operations where modernization has been adopted, Magnus Cleaning Methods have amply proved their superiority in every phase of cleaning.

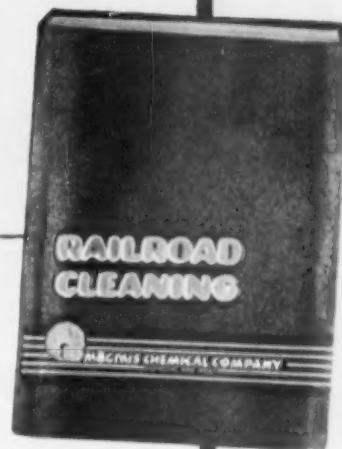
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Magnus Decarbonizing Cleaner in Magnus Aja-Dip Cleaning Machines will reduce hand labor on cleaning diesel parts by close to 85%... will cut the time required in half... and will save more than half of the cleaner costs. Magnus Diesel Magnisol for cleaning the exteriors of road engines will cut manpower and time in half... and will do a much better cleaning job. In diesel cabs, Magnus 5-RR will insure faster cleaning at greatly reduced cost.

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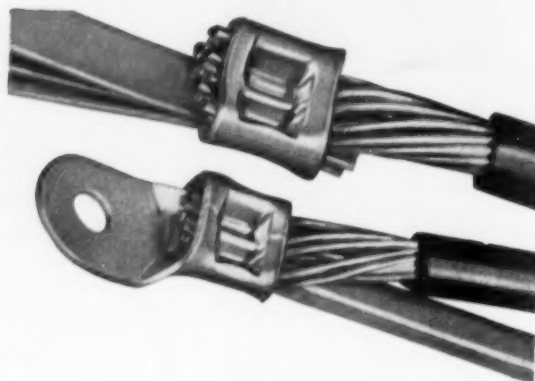
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AMP precision-engineered crimping tools are available for all wiring requirements. Each tool from the smallest hand tool to the powerful new DYNA-CRIMP pneumatic-hydraulic crimping unit (see below), is designed to produce uniformly high quality terminations with ease, precision, and efficiency. Write today for information and samples.

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Harry W. Jones, Jr.

SAFETY CAR HEATING & LIGHTING CO., LIGHTING DIVISION—The Lighting Division has been formed for manufacture and marketing of Safety's line of passenger-car lighting fixtures, luggage racks and lighting equipment for stations and terminals. The division has been separated from the company's main operation at New Haven and has headquarters in a newly acquired plant at Milford, Conn. *Harry W. Jones, Jr.*, assistant sales manager, has been appointed manager of all operations of the new division.



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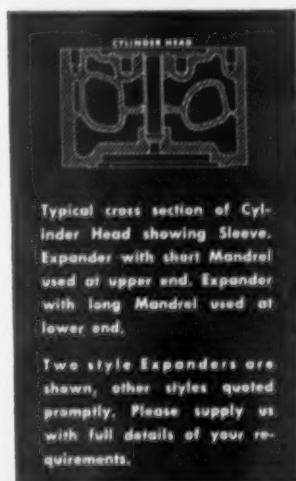
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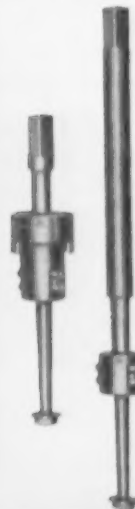
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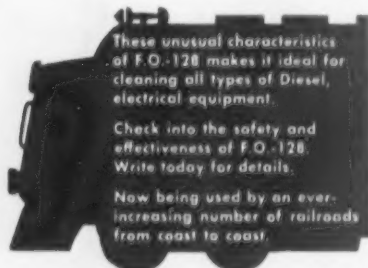
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R. R. King



C. H. Petersen

PAXTON-MITCHELL COMPANY.—Robert R. King, vice-president, engineering and production, has been appointed vice-president and general manager. Christian H. Petersen, sales and service engineer, has been named sales and service manager.

NATIONAL PNEUMATIC COMPANY.—T. Clifford Laurent has rejoined as sales engineer for its transit and railroad division, at New York.

VANADIUM CORPORATION OF AMERICA.—Frederick F. Franklin, assistant district manager at Cleveland, has been

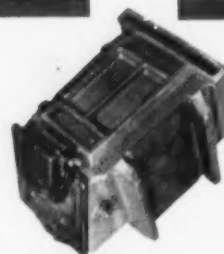
appointed district manager there. He succeeds Paul H. Shaeffer, who has retired but will continue to serve as special representative.

UNION SPRING & MANUFACTURING CO.—Leo T. Duffy, of the Railway Repair & Supply Co., has been appointed manager of railway sales in the Chicago district for Union Spring & Manufacturing Co.

UNITED STATES RAILWAY EQUIPMENT COMPANY.—Edward J. England, has been appointed executive vice-president at Chicago.

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You are assured complete quality control, from raw material to finished journal box, when you choose Franklin Balmar. Both surface-bearing and roller bearing boxes are made of electric furnace steel, cast in our own foundry—and machined to close tolerances on modern equipment by our own highly trained personnel. When you need journal boxes or other steel castings send us your inquiries.



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H. M. Aitkenhead

ACF INDUSTRIES, INCORPORATED.—Harold M. Aitkenhead has been appointed district sales manager of the St. Louis office. Mr. Aitkenhead, formerly sales agent in the St. Louis office, will report to E. B. Carpenter, western sales manager.

GRAYBAR ELECTRIC COMPANY.—G. L. Call, branch manager at Akron, Ohio, has been appointed Cincinnati district sales manager.

PITTSBURGH SCREW & BOLT CO.—John Krause, Jr., has been appointed assistant to general manager of sales. He was formerly assistant general manager of sales of Oliver Iron & Steel Corp.

DEARBORN CHEMICAL COMPANY.—Roger Q. Milnes, vice-president and sales manager, Western Railroad division, has retired. Samuel C. Johnson, has been appointed vice-president, Railroad Department, assuming responsibility for all railroad sales. Mr. Johnson was formerly vice-president, Eastern division, Railroad Department.

WYANDOTTE CHEMICAL CORPORATION.—James S. Hubbard and Charles J. Martin have been appointed sales managers of district offices at Boston and Buffalo, respectively.

Obituary

ERNEST KUEHN, 69, retired Pacific Coast regional manager of the Electro-Motive Division of General Motors Corporation, died December 8 at Indio, Cal.

WILLIAM W. VOSPER, founder of the Toledo Pipe Threading Machine Company, died December 17, at the age of 79 years.

GEORGE A. MURPHY, SR., 73, retired vice-president and consultant of Magnus Metal Corporation, died at Chicago December 16.

DUNCAN W. FRASER, 79, who retired as chairman of the board of American Locomotive Company in April 1954, died December 20 at Harkness Pavilion of Columbia Presbyterian Medical Center, New York.

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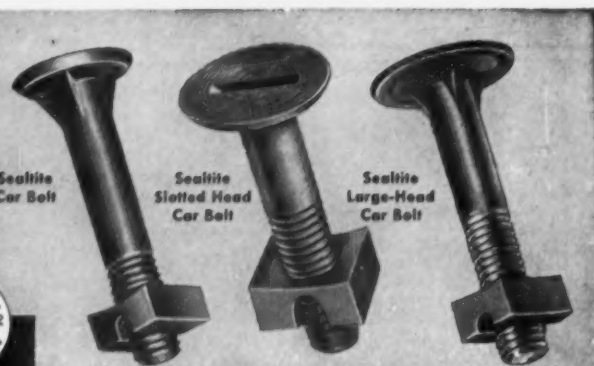
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Objective:
**LOWER
OPERATING
RATIOS using
HEAVY
FUEL OILS**
treated by

Nalco[®]



● Nalco is proud to have the privilege of working with the "Progressive Chesapeake and Ohio Railway" toward the objective of lower operating ratios using heavy fuel oils properly treated with Nalco Fuel Oil Treatments.

In addition to initial cost savings using heavy fuel oils and Nalco Treatment, there are also these added operating advantages: greater fuel efficiency, minimized sludging problems on the locomotive, in storage and fueling facilities.

For full details on Nalco Fuel Oil Treatments to help you attain the objective of lower operating ratios, call your Nalco Representative, or write direct.

Other Nalco Products in use by the C. & O. include chemicals for control of scaling and corrosion in diesel cooling systems, diesel steam generator systems, steam locomotives and stationary boilers.

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THE *Nalco* **SYSTEM • Serving Railroads**
through Practical Applied Science

RAILROADS invest in roller bearings for two reasons: to end the hot box problem and cut operating and maintenance costs to a minimum. The *one* bearing you can count on to do this is the Timken® tapered roller bearing. And here's why:

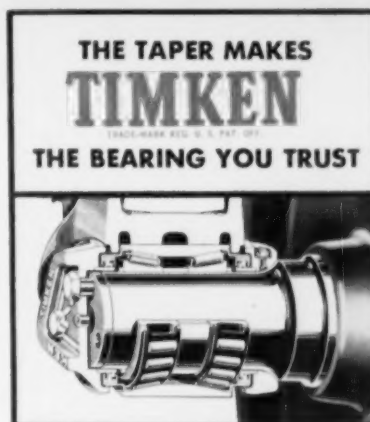
1) *No lateral movement within the bearing.* In straight roller bearings auxiliary thrust devices are needed to take thrust loads. These thrust devices are not completely effective and are difficult to lubricate with grease. And lateral movement causes scuffing of rollers and races. It also pumps lubricant through the seal and out of the journal box, draws dirt and water in.

In Timken bearings the taper prevents lateral movement, enables them to take

the thrust. They always *roll* the load, never slide it. There's no pumping action. This helps end the hot box problem, means less maintenance, less lubricant and longer bearing life.

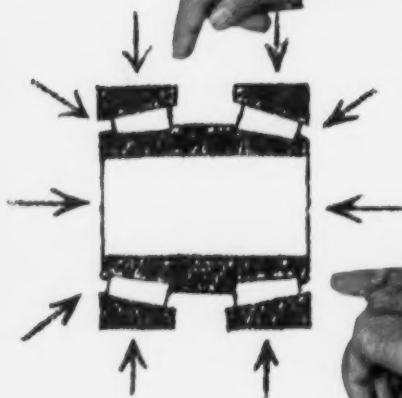
2) *Positive roller alignment.* The taper holds ends of rollers snug against the rib, where wide area contact keeps them properly aligned. Rollers can't skew to upset the full line contact and shorten the life of the bearing.

When you buy Timken roller bearings to end the hot box problem and cut operating and maintenance costs to a minimum, you can count on them to do it. It's the taper! The Timken Roller Bearing Co., Canton 6, Ohio. Cable address: "TIMROSCO".



This month Dr. Oscar Horger demonstrates how Timken® bearings carry combination loads without auxiliary thrust devices

The taper makes TIMKEN® the only journal bearing that delivers what you expect when you buy a roller bearing



**TIMKEN BEARING
TAKES ANY COMBINATION
OF RADIAL AND THRUST LOADS**

NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER
BEARING TAKES RADIAL ○ AND THRUST □ LOADS OR ANY COMBINATION

